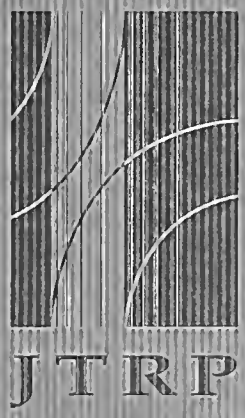

Joint
Transportation
Research
Program

FHWA/IN/JHRP-96/21-03

Final Report
Volume III (Appendix 3)

THREE DIMENSIONAL FINITE ELEMENT PROGRAMS FOR PAVEMENT ANALYSIS

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FINAL REPORT

FHWA/IN/JHRP-96/21

THREE DIMENSIONAL FINITE ELEMENT PROGRAMS FOR PAVEMENT ANALYSIS

Volume III(Appendix 3)

by

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Appendix 3

Verification of the two dimensional finite element code

Problem 1. A rectangular plate of elastic-plastic material with Mises criterion subjected to ramp loadings. Progress of the plastic zone is shown. Deflections are compared with the solutions obtained by using ANSYS.

Problem 2. A rectangular plate of elastic-plastic material with Drucker-Prager criterion subjected to ramp loadings.

Problem 3. A rectangular plate of elastic-plastic material with Mises criterion subjected to sinusoidal loadings

Problem 4. A rectangular plate of elastic-plastic material with Mises criterion subjected to pulse loadings

Problem 5. A rectangular plate of viscoelastic material of Maxwell type subjected to ramp loadings

Problem 1.

A rectangular plate of elastic-plastic material with Mises criteron subjected to ramp loadings

- **Problem description and loading functions**
- **Deflection and stress plots and their comparions with results obtained by using ANSYS**
- **Input file for Soild2D**
- **Sample output of Soild2D**
- **Input and output of ANSYS**

Problem description and loading functions

2D Straight Edge boundary on von Mises Material

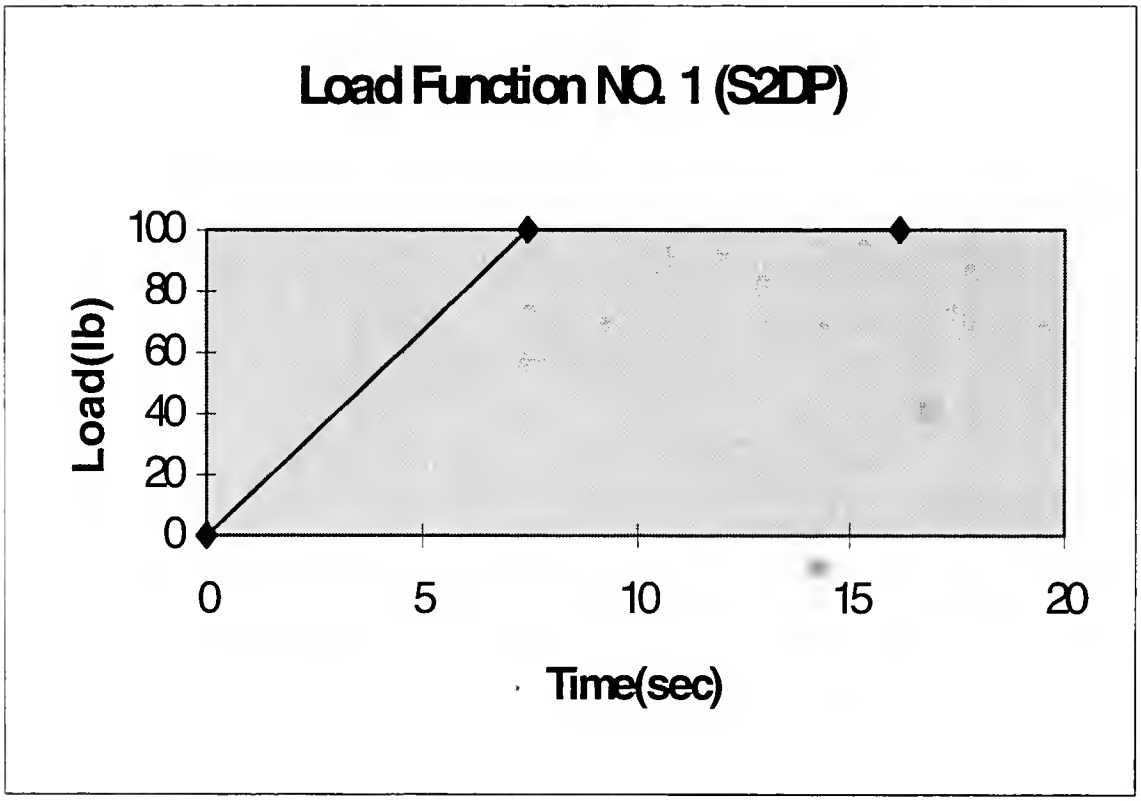
Input:

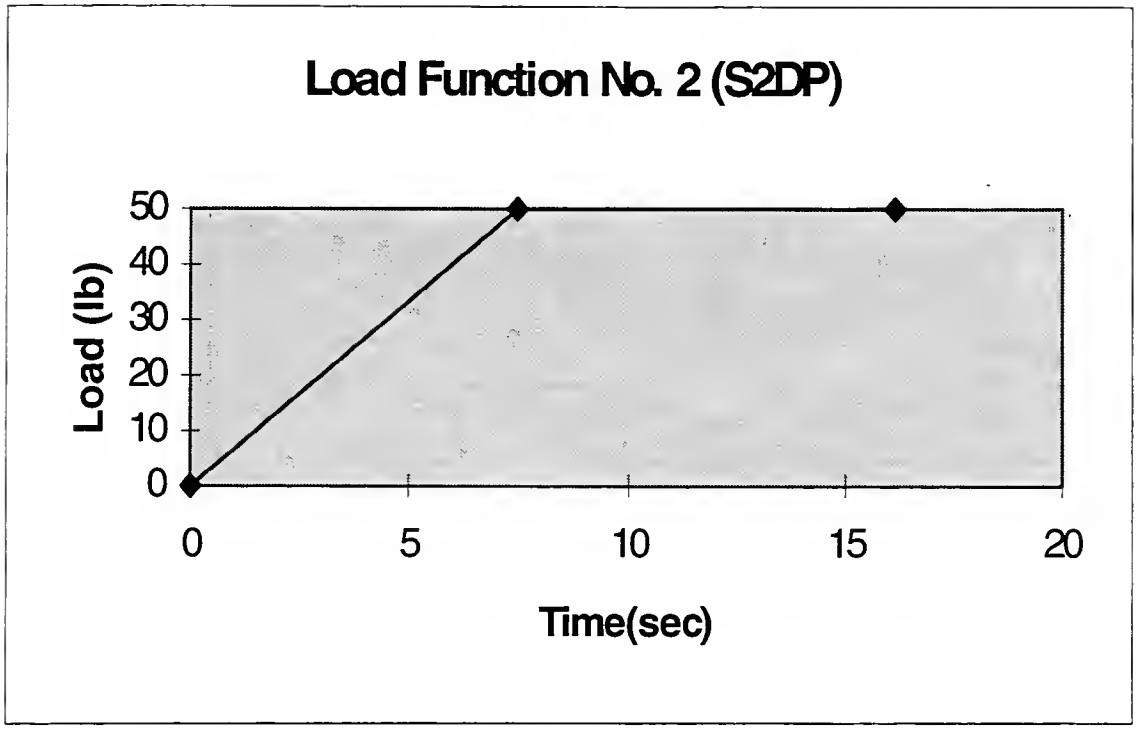
1. Geometry and finite element mesh are shown.

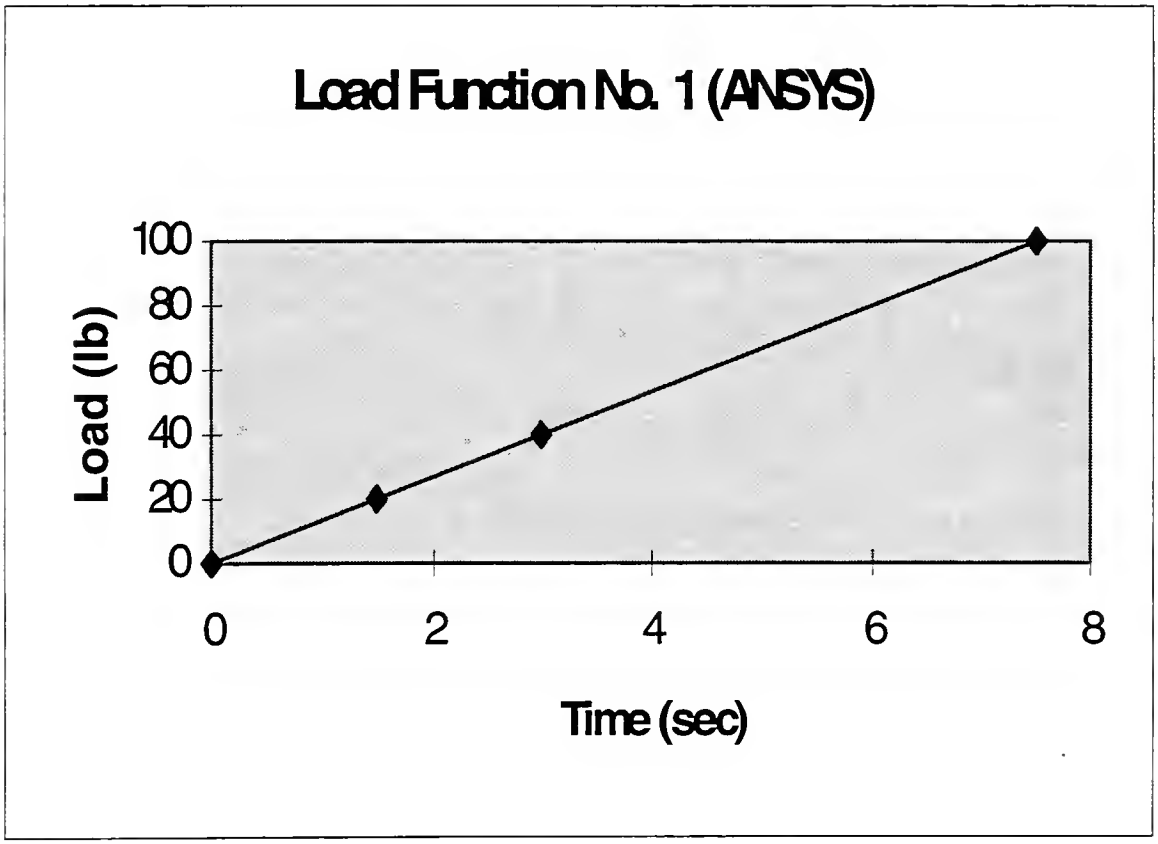
2. Material used in this problem is metal with the following properties:

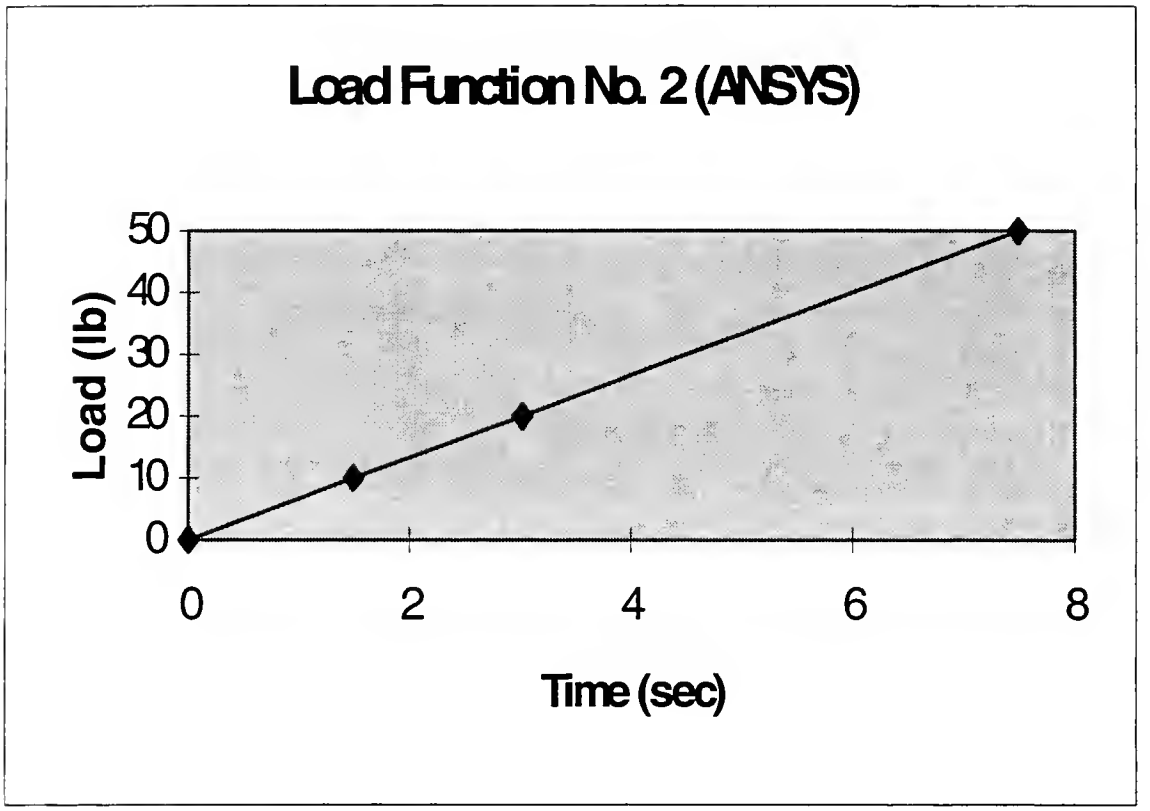
E	=	9000 psi
υ	=	0.3
ρ	=	4.67e-2 $lb - \sec^2 / in^4$
E_t	=	500 psi
σ_{yp}	=	80 psi (tensile strength)
β	=	0.0 (kinematics hardening rule)

3. Loading functions for S2DP and ANSYS are ramp loading functions.




Load Function No. 2 (S2DP)
Load (lb)
50
40
30
20
10
0
0
5
10
15
20
Time(sec)


Load Function No. 1 (ANSYS)
Load (lb)
100
80
60
40
20
0
0
2
4
6
8
Time (sec)

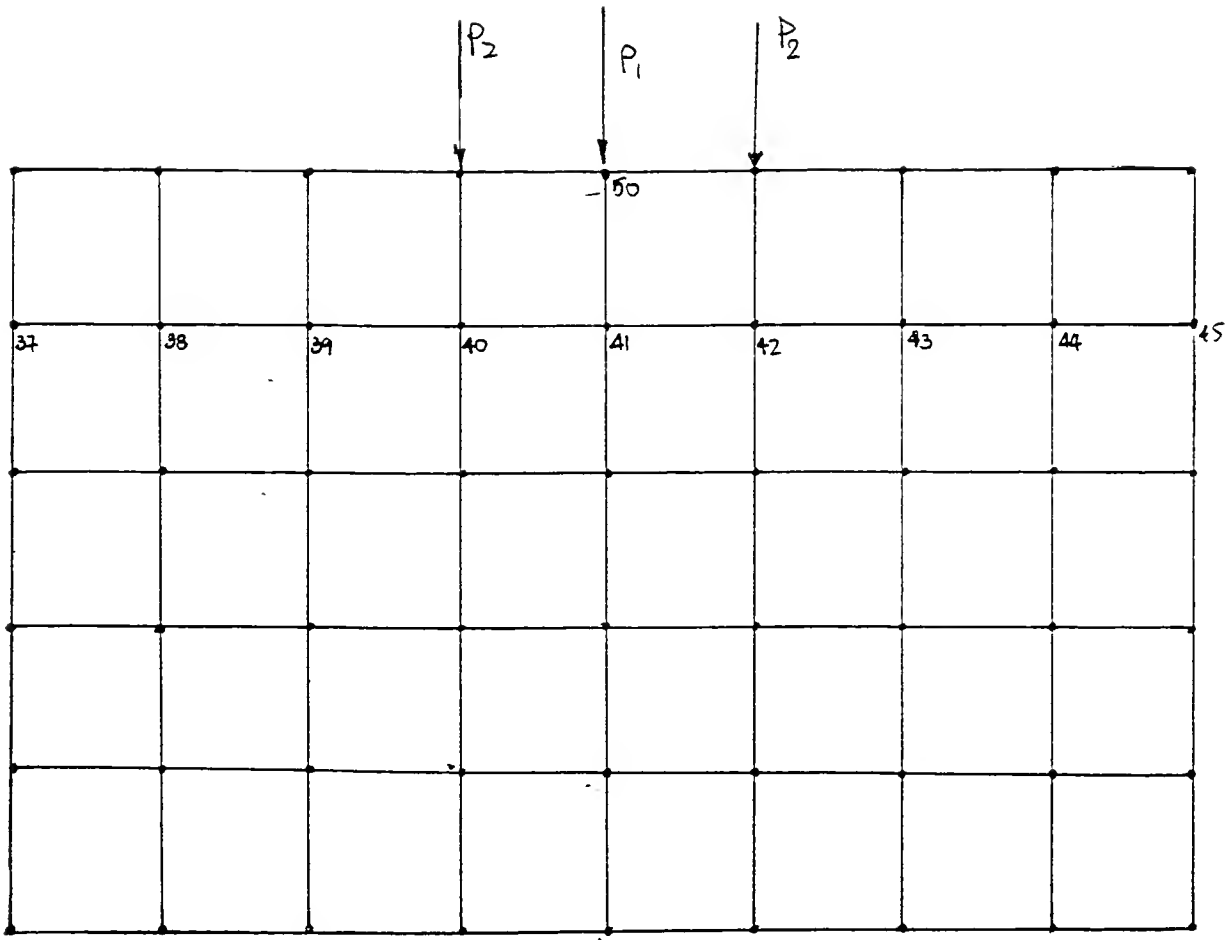


4. The examples for input data of both S2DP and ANSYS are shown after the problem results

Problem Results

S2DP Results:

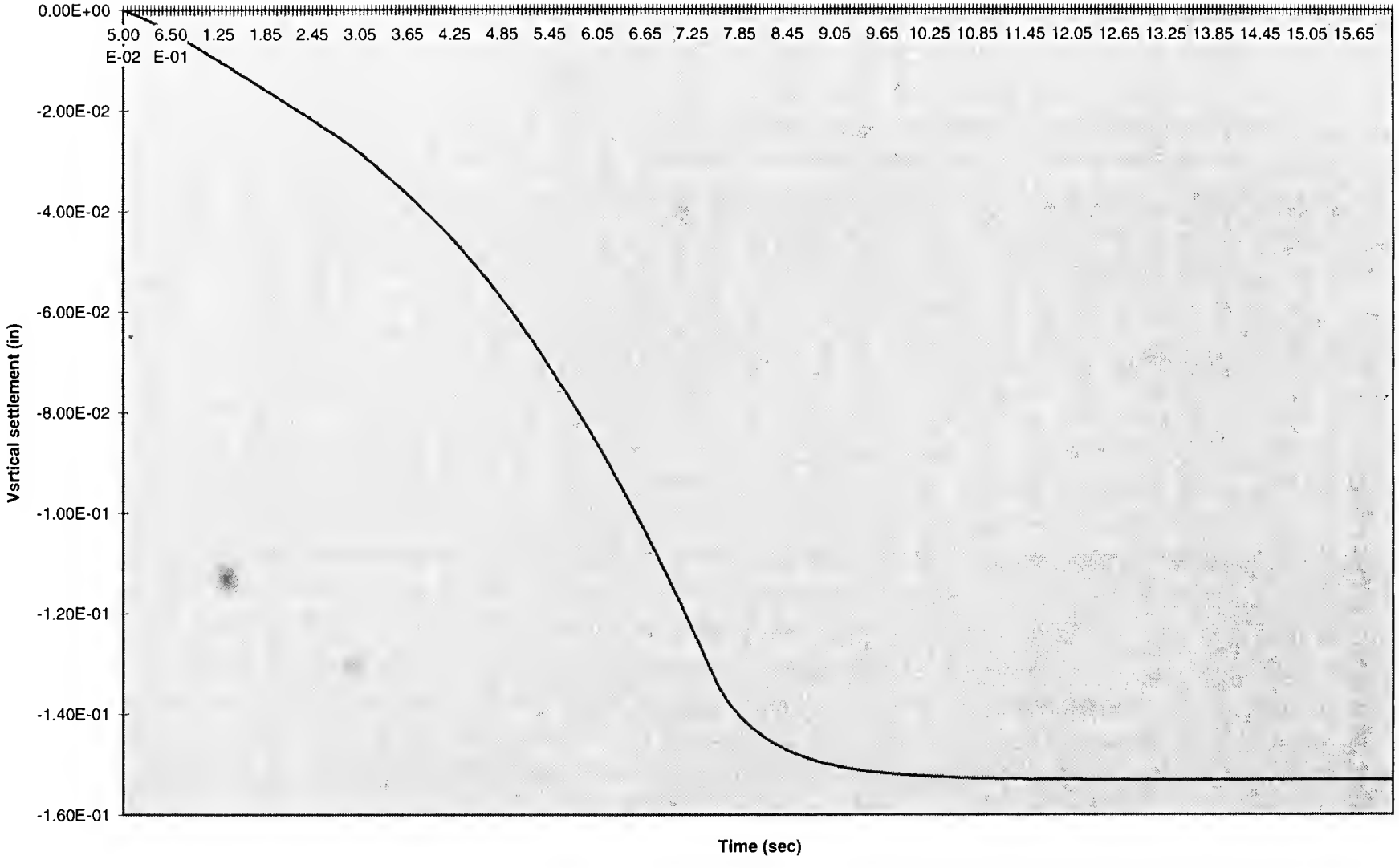
1. The Settlement of node no. 50 versus time are shown as the following.

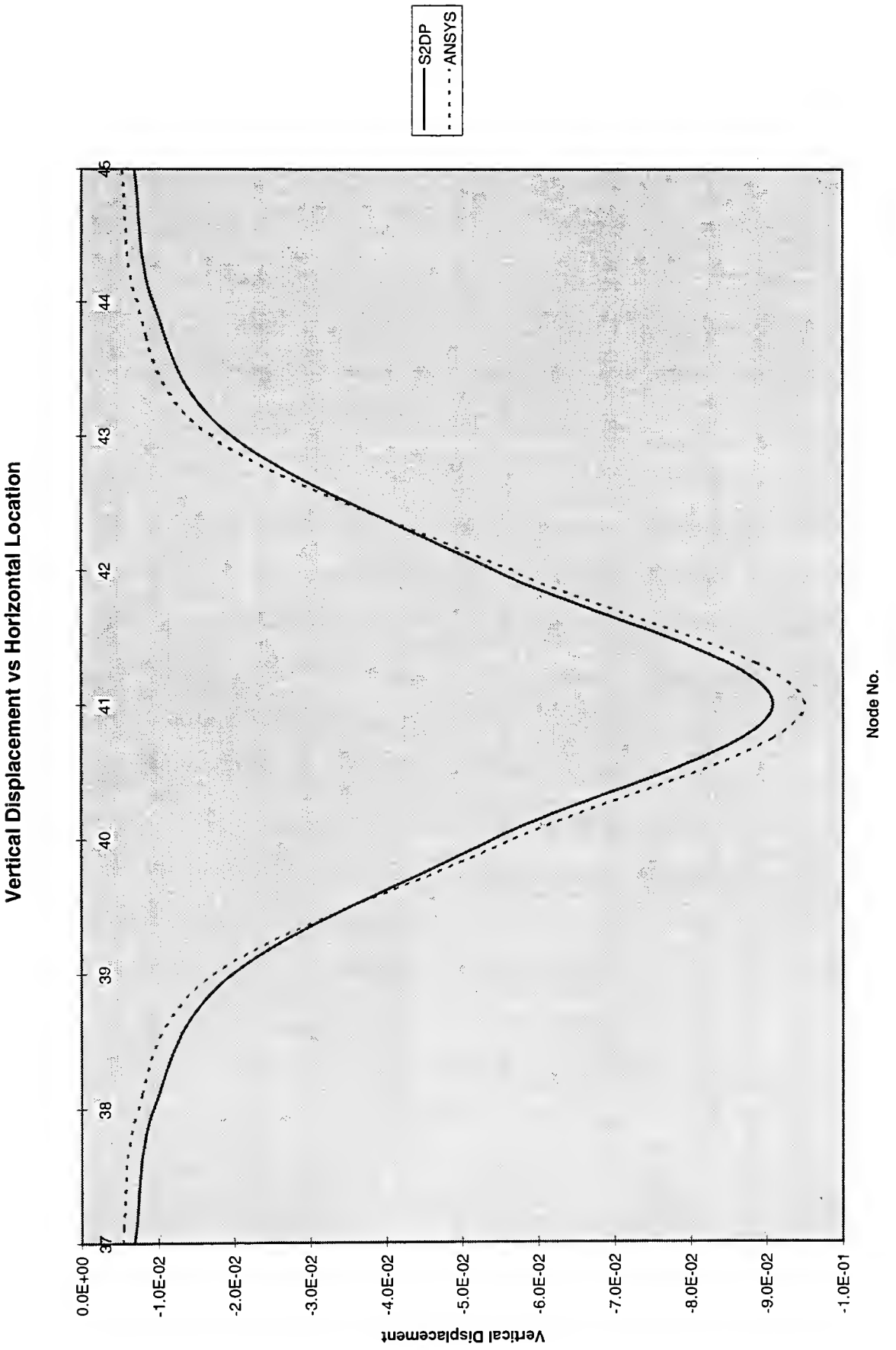


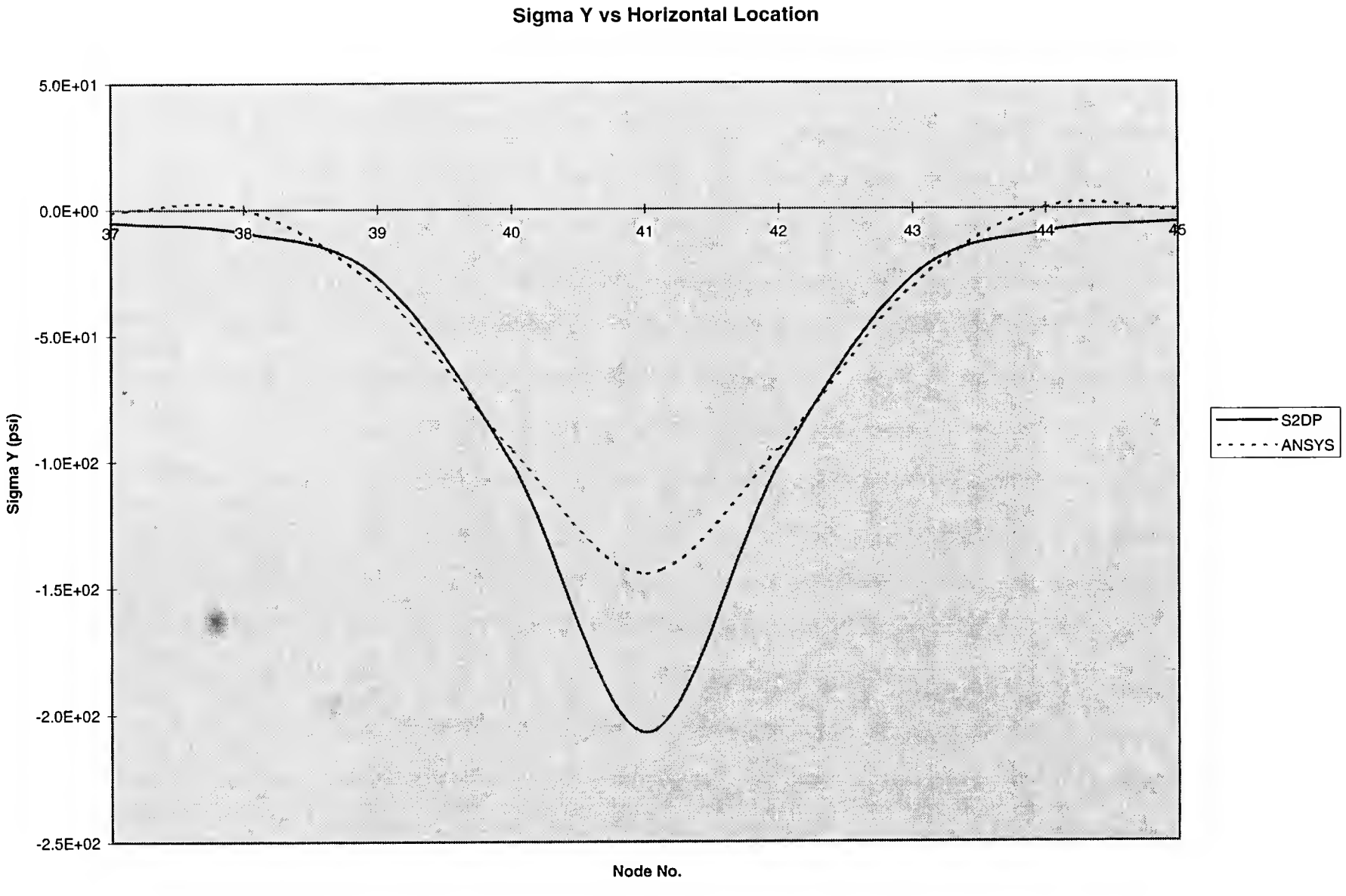
FINITE ELEMENT MESH

Deflection and stress plots

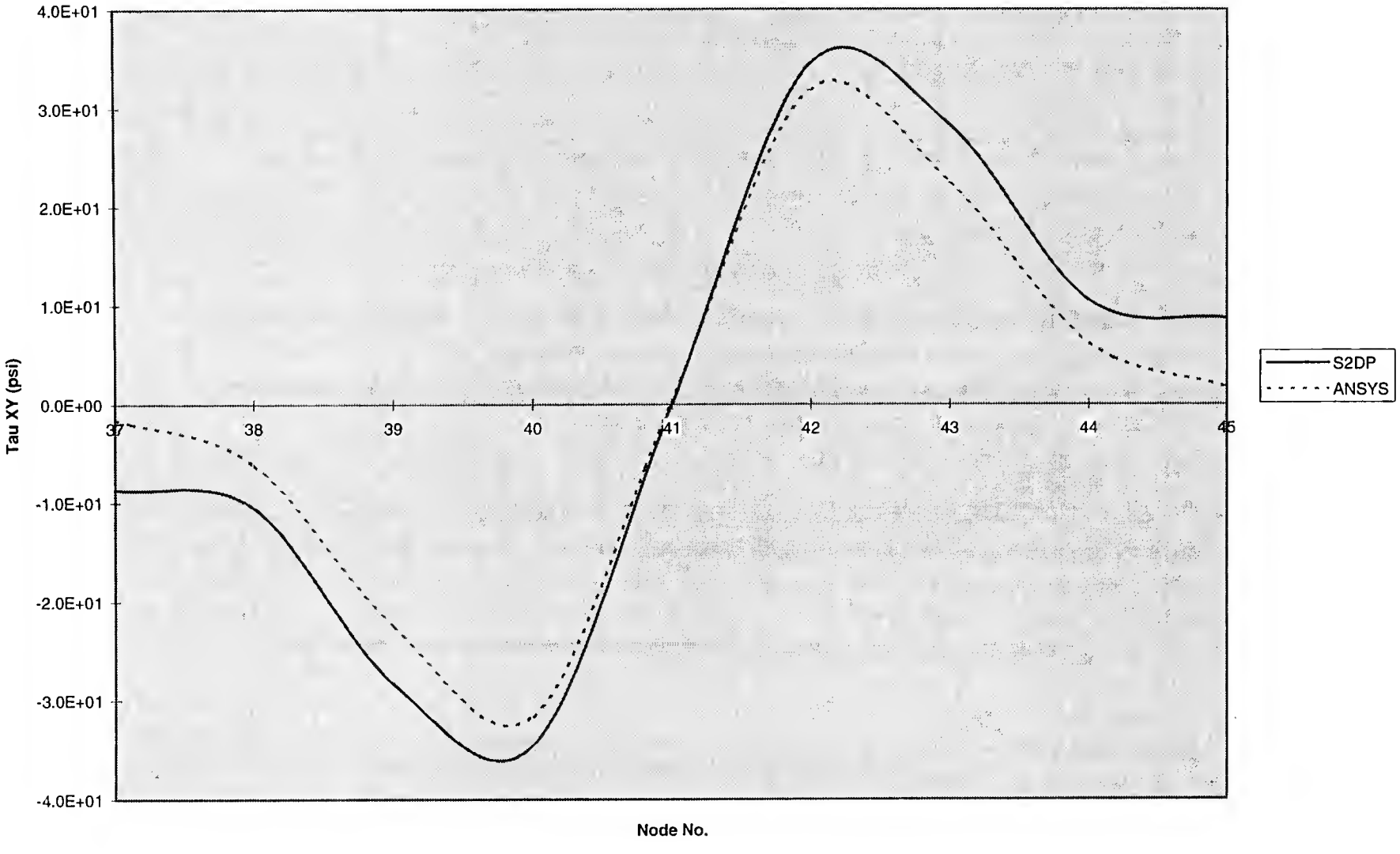
Vertical settlement at node 50 vs Time



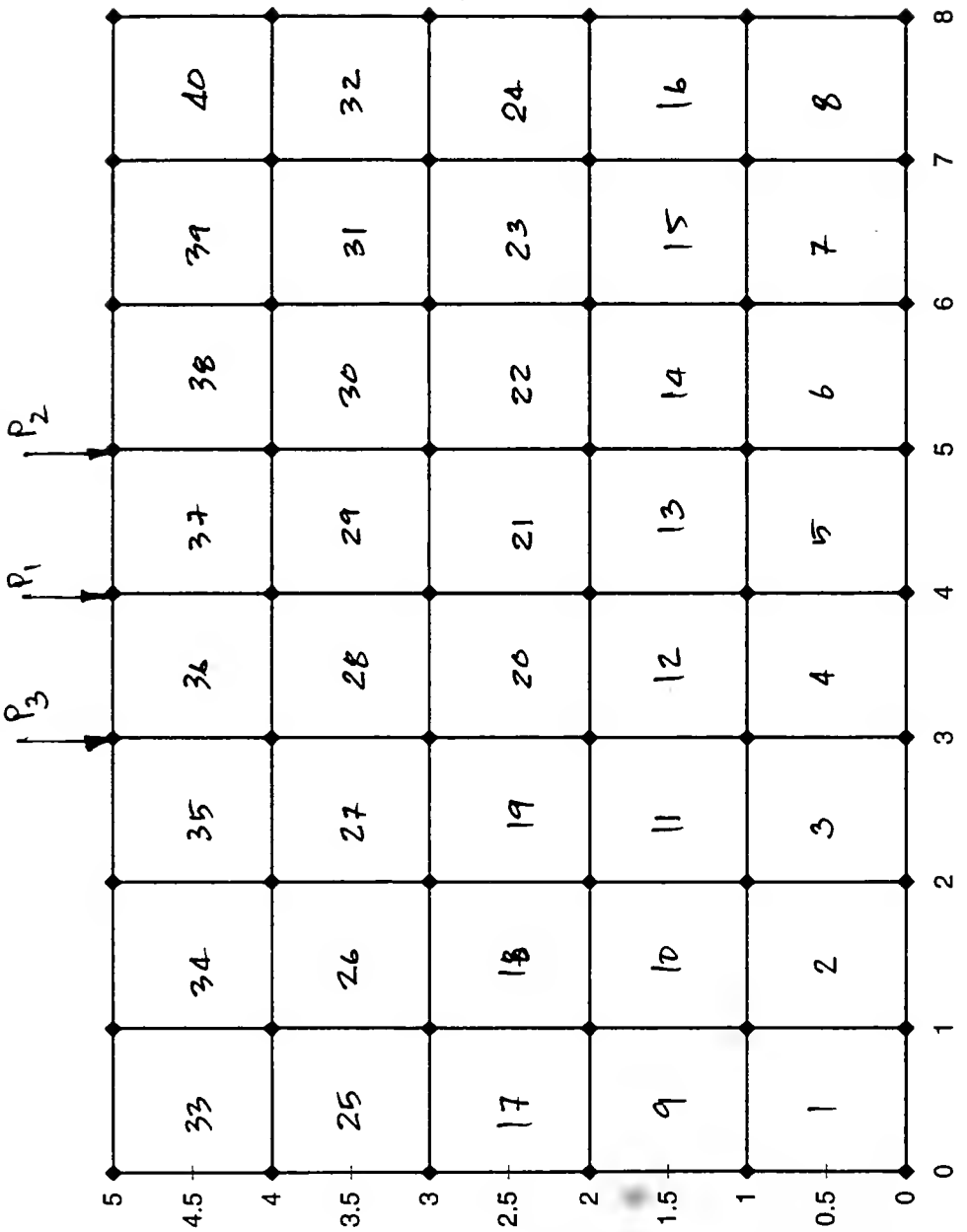

Vertical Displacement vs Horizontal Location
S2DP
ANSYS
Vertical Displacement
0.0E+00
-1.0E-02
-2.0E-02
-3.0E-02
-4.0E-02
-5.0E-02
-6.0E-02
-7.0E-02
-8.0E-02
-9.0E-02
-1.0E-01
37
38
39
40
41
42
43
44
45
Node No.

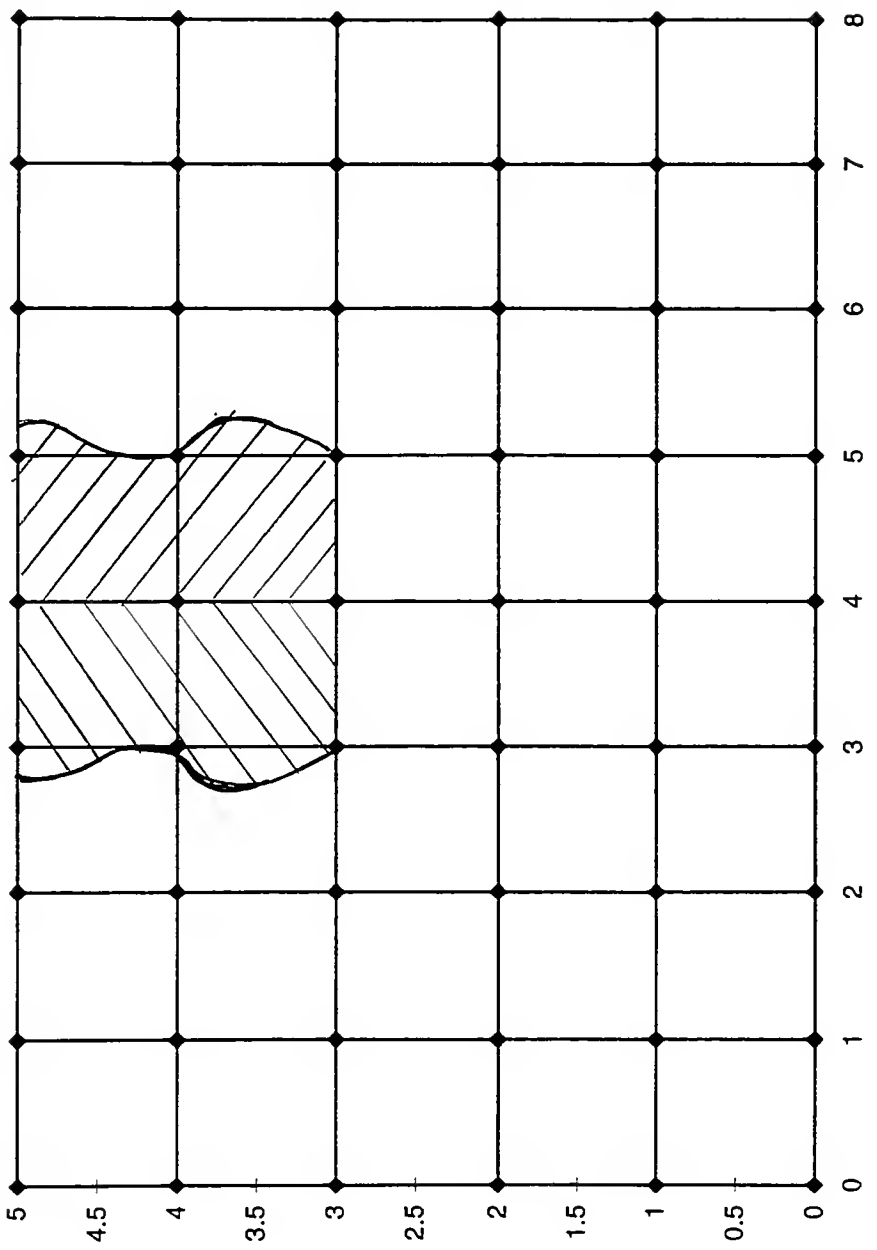

Sigma Y vs Horizontal Location
5.0E+01
0.0E+00
-5.0E+01
-1.0E+02
-1.5E+02
-2.0E+02
-2.5E+02
37
38
39
40
41
42
43
44
45
Sigma Y (psi)
Node No.
S2DP
ANSYS

Shear XY vs Horrizontal Location

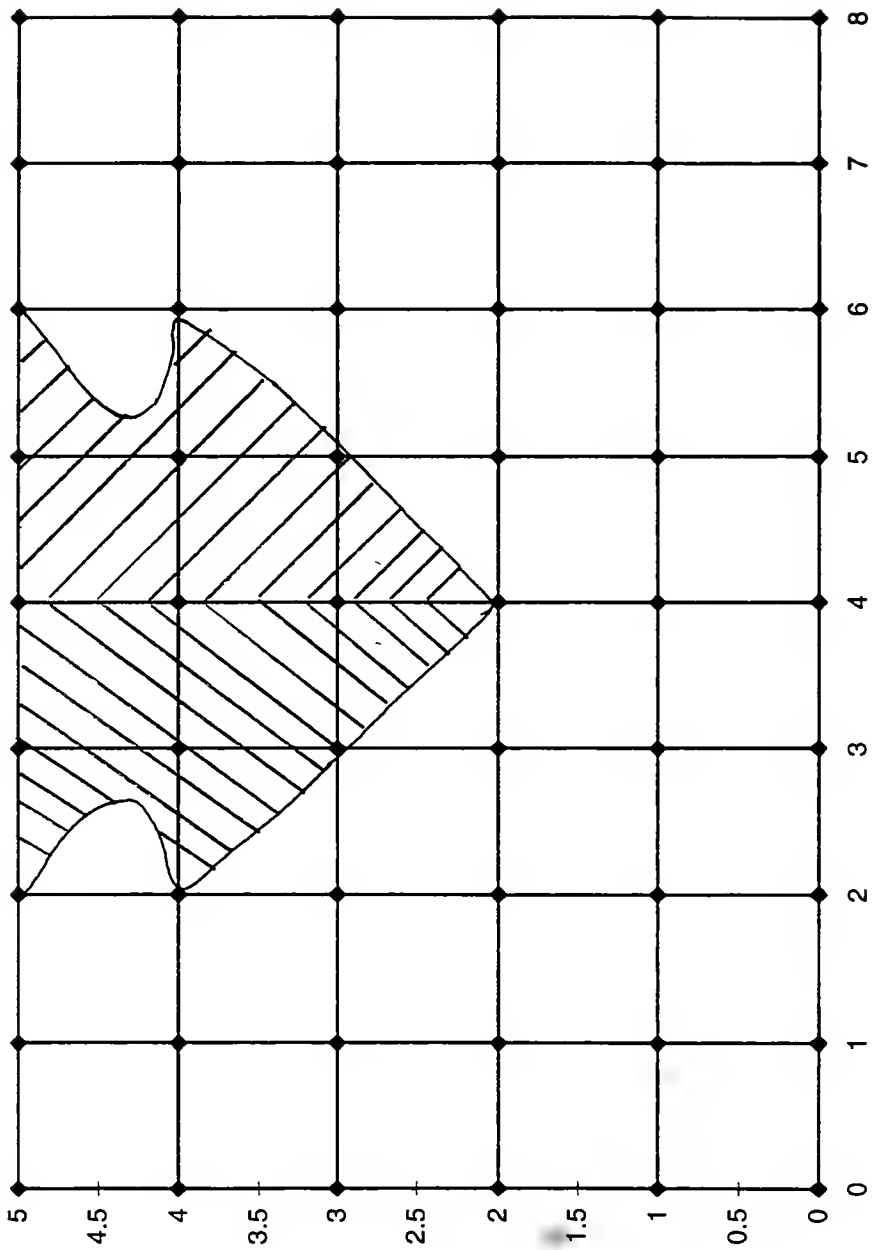


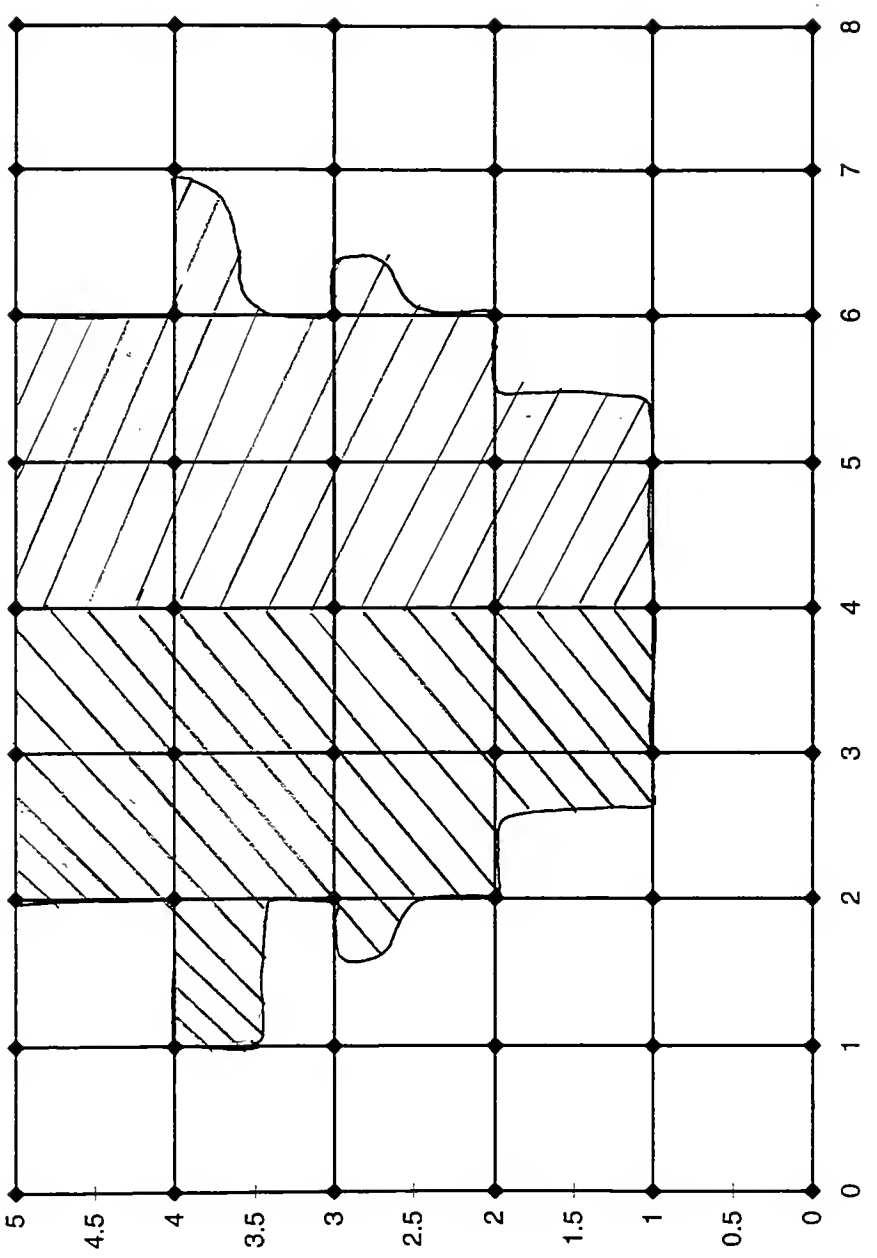
Geometry, Finite Element Mesh, and External Force



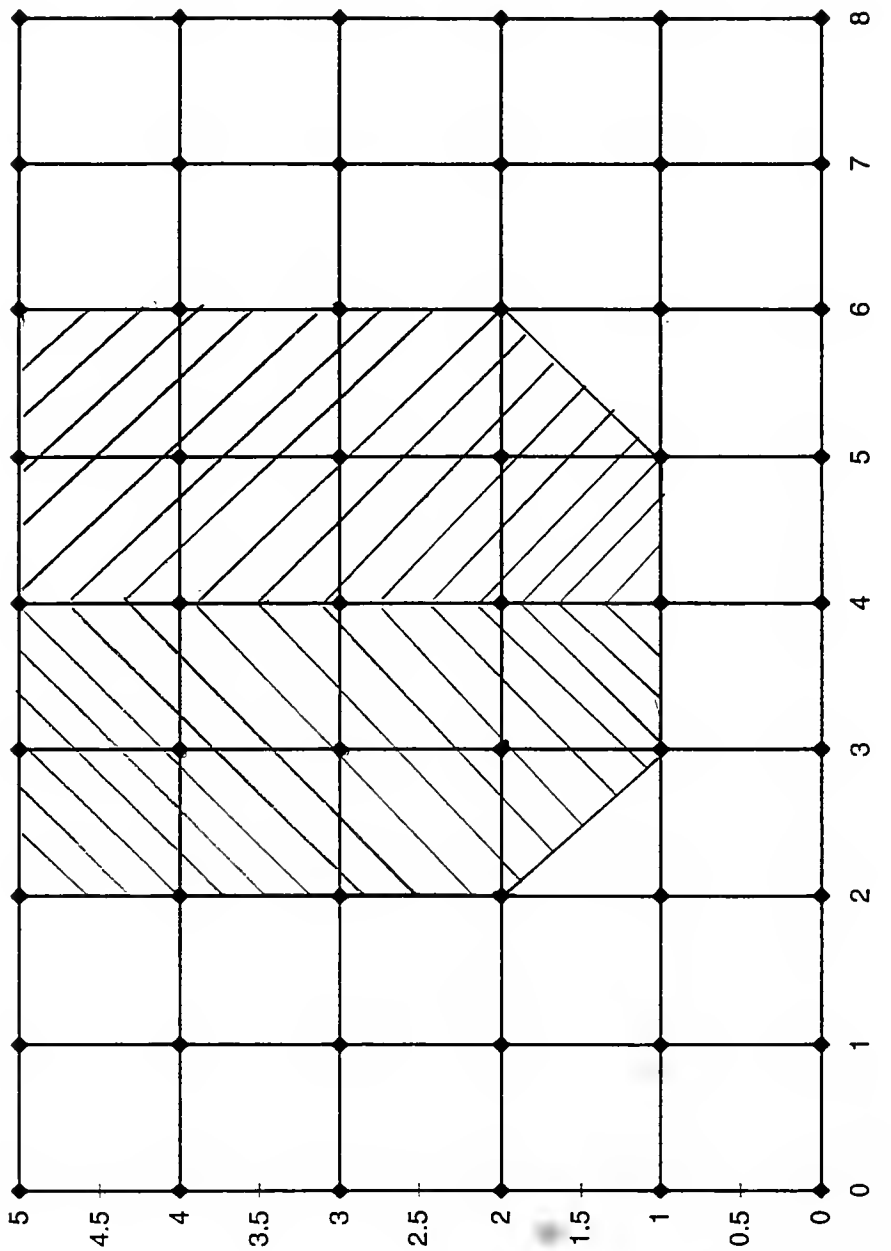


S2DP Plastic Zone at time step = 50000


S2DP Plastic Zone at time step = 60000
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
0
1
2
3
4
5
6
7
8



S2DP Plastic Zone at time step = 16181



ANSYS Plastic Zone at last time step

Input file for Solid2D

```
2 Dimensional straight edge boundary on von Mises Material
500 54 40 1 27 2 10000000  1.e-4  1.e+4  1.e-10  0.
0 1 0 1 1
1      0.     0.         1   1
2      1.     0.         1   1
3      2.     0.         1   1
4      3.     0.         1   1
5      4.     0.         1   1
6      5.     0.         1   1
7      6.     0.         1   1
8      7.     0.         1   1
9      8.     0.         1   1
10     0.     1.         1   0
11     1.     1.         0   0
12     2.     1.         0   0
13     3.     1.         0   0
14     4.     1.         0   0
15     5.     1.         0   0
16     6.     1.         0   0
17     7.     1.         0   0
18     8.     1.         1   0
19     0.     2.         1   0
20     1.     2.         0   0
21     2.     2.         0   0
22     3.     2.         0   0
23     4.     2.         0   0
24     5.     2.         0   0
25     6.     2.         0   0
26     7.     2.         0   0
27     8.     2.         1   0
28     0.     3.         1   0
29     1.     3.         0   0
30     2.     3.         0   0
31     3.     3.         0   0
32     4.     3.         0   0
33     5.     3.         0   0
34     6.     3.         0   0
35     7.     3.         0   0
36     8.     3.         1   0
37     0.     4.         1   0
38     1.     4.         0   0
39     2.     4.         0   0
40     3.     4.         0   0
41     4.     4.         0   0
42     5.     4.         0   0
43     6.     4.         0   0
44     7.     4.         0   0
45     8.     4.         1   0
46     0.     5.         1   0
47     1.     5.         0   0
48     2.     5.         0   0
49     3.     5.         0   0
50     4.     5.         0   0
51     5.     5.         0   0
52     6.     5.         0   0
53     7.     5.         0   0
54     8.     5.         1   0
1  1  2  11  10    1  1  1  1  1
```

```
2  2  3  12  11     1  1  2  1  1
3  3  4  13  12     1  1  3  1  1
4  4  5  14  13     1  1  4  1  1
5  5  6  15  14     1  1  5  1  1
6  6  7  16  15     1  1  6  1  1
7  7  8  17  16     1  1  7  1  1
8  8  9  18  17     1  1  8  1  1
9   10  11  20  19    1  2  1  1  1
10  11  12  21  20    1  2  2  1  1
11  12  13  22  21    1  2  3  1  1
12  13  14  23  22    1  2  4  1  1
13  14  15  24  23    1  2  5  1  1
14  15  16  25  24    1  2  6  1  1
15  16  17  26  25    1  2  7  1  1
16  17  18  27  26    1  2  8  1  1
17  19  20  29  28    1  3  1  1  1
18  20  21  30  29    1  3  2  1  1
19  21  22  31  30    1  3  3  1  1
20  22  23  32  31    1  3  4  1  1
21  23  24  33  32    1  3  5  1  1
22  24  25  34  33    1  3  6  1  1
23  25  26  35  34    1  3  7  1  1
24  26  27  36  35    1  3  8  1  1
25  28  29  38  37    1  4  1  1  1
26  29  30  39  38    1  4  2  1  1
27  30  31  40  39    1  4  3  1  1
28  31  32  41  40    1  4  4  1  1
29  32  33  42  41    1  4  5  1  1
30  33  34  43  42    1  4  6  1  1
31  34  35  44  43    1  4  7  1  1
32  35  36  45  44    1  4  8  1  1
33  37  38  47  46    1  5  1  1  1
34  38  39  48  47    1  5  2  1  1
35  39  40  49  48    1  5  3  1  1
36  40  41  50  49    1  5  4  1  1
37  41  42  51  50    1  5  5  1  1
38  42  43  52  51    1  5  6  1  1
39  43  44  53  52    1  5  7  1  1
40  44  45  54  53    1  5  8  1  1
1 1 4.67e-2  9000.0  0.30  80.
0.    0.  2   500.   0.  0.4
2 3
3
0.                  0.0
7.5                -100.0
1000.               -100.0
3
0.                  0.0
7.5                -50.0
1000.               -50.0

50  2 1
49  2 2
51  2 2

37 0 2
38 0 2
39 0 2
```

```
40 0 2
41 0 2
42 0 2
43 0 2
44 0 2
45 0 2

37 3 2
38 3 2
39 3 2
40 3 2
41 3 2
42 3 2
43 3 2
44 3 2
45 3 2

37 3 3
38 3 3
39 3 3
40 3 3
41 3 3
42 3 3
43 3 3
44 3 3
45 3 3
```

Sample output of Solid2D

card 1 2D straight edge boundary w/ ramp load on von Mises Material

---

card 2 parameter card

no of time-steps skipped between outputs = 500
number of nodes = 54
number of elements = 40
number of materials = 1
number of output req = 27
no. of d.o.f/node = 2
no. of time steps = 1000000
time increment = .100E-03
coeff of mass damping = .100E+05
tolerance limit = .100E-09
acceleration of gravity = .00000

card 3 index card

index for accel. = 0
index for force = 1
index for I. C. = 0
index for mesh output(1) or not(0) = 1
index for plane stress(1) or strain(2) = 1

card 4 nodal point data

node no.	x-ordinate	y-ordinate	ifx	ify
1	.000	.000	1	1
2	1.000	.000	1	1
3	2.000	.000	1	1
4	3.000	.000	1	1
5	4.000	.000	1	1
6	5.000	.000	1	1
7	6.000	.000	1	1
8	7.000	.000	1	1
9	8.000	.000	1	1
10	.000	1.000	1	0
11	1.000	1.000	0	0
12	2.000	1.000	0	0
13	3.000	1.000	0	0
14	4.000	1.000	0	0
15	5.000	1.000	0	0
16	6.000	1.000	0	0
17	7.000	1.000	0	0
18	8.000	1.000	1	0
19	.000	2.000	1	0
20	1.000	2.000	0	0
21	2.000	2.000	0	0
22	3.000	2.000	0	0
23	4.000	2.000	0	0
24	5.000	2.000	0	0
25	6.000	2.000	0	0
26	7.000	2.000	0	0
27	8.000	2.000	1	0
28	.000	3.000	1	0
29	1.000	3.000	0	0
30	2.000	3.000	0	0
31	3.000	3.000	0	0
32	4.000	3.000	0	0
33	5.000	3.000	0	0

34	6.000	3.000	0	0
35	7.000	3.000	0	0
36	8.000	3.000	1	0
37	.000	4.000	1	0
38	1.000	4.000	0	0
39	2.000	4.000	0	0
40	3.000	4.000	0	0
41	4.000	4.000	0	0
42	5.000	4.000	0	0
43	6.000	4.000	0	0
44	7.000	4.000	0	0
45	8.000	4.000	1	0
46	.000	5.000	1	0
47	1.000	5.000	0	0
48	2.000	5.000	0	0
49	3.000	5.000	0	0
50	4.000	5.000	0	0
51	5.000	5.000	0	0
52	6.000	5.000	0	0
53	7.000	5.000	0	0
54	8.000	5.000	1	0

card 5 element data

ele. no.	node-1	node-2	node-3	node-4	mat-typ	row-no	col-no	ele-cond.
1	1	2	11	10	1	1	1	1
2	2	3	12	11	1	1	2	1
3	3	4	13	12	1	1	3	1
4	4	5	14	13	1	1	4	1
5	5	6	15	14	1	1	5	1
6	6	7	16	15	1	1	6	1
7	7	8	17	16	1	1	7	1
8	8	9	18	17	1	1	8	1
9	10	11	20	19	1	2	1	1
10	11	12	21	20	1	2	2	1
11	12	13	22	21	1	2	3	1
12	13	14	23	22	1	2	4	1
13	14	15	24	23	1	2	5	1
14	15	16	25	24	1	2	6	1
15	16	17	26	25	1	2	7	1
16	17	18	27	26	1	2	8	1
17	19	20	29	28	1	3	1	1
18	20	21	30	29	1	3	2	1
19	21	22	31	30	1	3	3	1
20	22	23	32	31	1	3	4	1
21	23	24	33	32	1	3	5	1
22	24	25	34	33	1	3	6	1
23	25	26	35	34	1	3	7	1
24	26	27	36	35	1	3	8	1
25	28	29	38	37	1	4	1	1
26	29	30	39	38	1	4	2	1
27	30	31	40	39	1	4	3	1
28	31	32	41	40	1	4	4	1
29	32	33	42	41	1	4	5	1
30	33	34	43	42	1	4	6	1
31	34	35	44	43	1	4	7	1
32	35	36	45	44	1	4	8	1
33	37	38	47	46	1	5	1	1
34	38	39	48	47	1	5	2	1

35	39	40	49	48	1	5	3	1
36	40	41	50	49	1	5	4	1
37	41	42	51	50	1	5	5	1
38	42	43	52	51	1	5	6	1
39	43	44	53	52	1	5	7	1
40	44	45	54	53	1	5	8	1

card 6 & 7 material property data

material group no.	material type no.	mass density	Youngs modulus	Poisson ratio	tensile strength
1	1	.4670E-01	.9000E+04	.300	.8000E+02

cohesion	phi angle	yield criterion	tangent modulus	hardening rule	thickness(b)
.0000E+00	.00	2	.5000E+03	.000	.400

card 11 prescribed impact force

total no. of impact force history = 2

total no. of nodes applied by impact force = 3

card 12 & 13 impact force history card

force history no.	pair no.	time	iforce
1	1	.0000E+00	.0000E+00
1	2	.7500E+01	-.1000E+03
1	3	.1000E+04	-.1000E+03

card 12 & 13 impact force history card

force history no.	pair no.	time	iforce
2	1	.0000E+00	.0000E+00
2	2	.7500E+01	-.5000E+02
2	3	.1000E+04	-.5000E+02

card 14 nodal impact force information

node no.	x-(1),y(2)	force history no.
50	2	1
49	2	2
51	2	2

card 21 stress output information card

seq.	node#	d-(0),v-(1),a-(2),sig-(3)	x(1),y(2),xy(3)
1	37	0	2
2	38	0	2
3	39	0	2
4	40	0	2
5	41	0	2
6	42	0	2
7	43	0	2
8	44	0	2
9	45	0	2
10	37	3	2
11	38	3	2
12	39	3	2
13	40	3	2
14	41	3	2
15	42	3	2
16	43	3	2
17	44	3	2
18	45	3	2
19	37	3	3

```
              20          38                  3                          3
              21          39                  3                          3
              22          40                  3                          3
              23          41                  3                          3
              24          42                  3                          3
              25          43                  3                          3
              26          44                  3                          3
              27          45                  3                          3
nstep=         500

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=        1000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=        1500

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=        2000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=        2500

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=        3000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=        3500

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=        4000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=        4500

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=        5000

 Plastic element no [element no.Gauss point no] =

     NONE
```

```
nstep=       5500

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       6000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       6500

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       7000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       7500

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       8000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       8500

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       9000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       9500

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      10000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      10500

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      11000

 Plastic element no [element no.Gauss point no] =
```

```
     NONE
nstep=      11500

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      12000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      12500

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      13000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      13500

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      14000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      14500

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      15000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      15500

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      16000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      16500

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      17000
```

```
 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      17500

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      18000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      18500

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      19000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      19500

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      20000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      20500

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      21000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      21500

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      22000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      22500

 Plastic element no [element no.Gauss point no] =
```

```
     NONE
nstep=      23000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      23500

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      24000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      24500

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      25000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      25500

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      26000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      26500

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      27000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      27500

 Plastic element no [element no.Gauss point no] =
   36.3    37.4
nstep=      28000

 Plastic element no [element no.Gauss point no] =
   36.3    37.4
nstep=      28500

 Plastic element no [element no.Gauss point no] =
   36.3    37.4
```

```
nstep=      29000

 Plastic element no [element no.Gauss point no] =
   36.3    37.4
nstep=      29500

 Plastic element no [element no.Gauss point no] =
   36.3    37.4
nstep=      30000

 Plastic element no [element no.Gauss point no] =
   36.2    36.3    37.1    37.4
nstep=      30500

 Plastic element no [element no.Gauss point no] =
   36.2    36.3    37.1    37.4
nstep=      31000

 Plastic element no [element no.Gauss point no] =
   36.2    36.3    37.1    37.4
nstep=      31500

 Plastic element no [element no.Gauss point no] =
   36.2    36.3    37.1    37.4
nstep=      32000

 Plastic element no [element no.Gauss point no] =
   36.2    36.3    37.1    37.4
nstep=      32500

 Plastic element no [element no.Gauss point no] =
   36.2    36.3    37.1    37.4
nstep=      33000

 Plastic element no [element no.Gauss point no] =
   36.2    36.3    37.1    37.4
nstep=      33500

 Plastic element no [element no.Gauss point no] =
   36.2    36.3    37.1    37.4
nstep=      34000

 Plastic element no [element no.Gauss point no] =
   36.2    36.3    37.1    37.4
nstep=      34500

 Plastic element no [element no.Gauss point no] =
   36.2    36.3    37.1    37.4
nstep=      35000

 Plastic element no [element no.Gauss point no] =
   36.2    36.3    37.1    37.4
nstep=      35500

 Plastic element no [element no.Gauss point no] =
   36.2    36.3    37.1    37.4
nstep=      36000
```

```
  Plastic element no [element no.Gauss point no] =
    36.2    36.3    36.4    37.1    37.3    37.4
 nstep=      36500

  Plastic element no [element no.Gauss point no] =
    36.2    36.3    36.4    37.1    37.3    37.4
 nstep=      37000

  Plastic element no [element no.Gauss point no] =
    36.2    36.3    36.4    37.1    37.3    37.4
 nstep=      37500

  Plastic element no [element no.Gauss point no] =
    36.2    36.3    36.4    37.1    37.3    37.4
 nstep=      38000

  Plastic element no [element no.Gauss point no] =
    36.2    36.3    36.4    37.1    37.3    37.4
 nstep=      38500

  Plastic element no [element no.Gauss point no] =
    36.2    36.3    36.4    37.1    37.3    37.4
 nstep=      39000

  Plastic element no [element no.Gauss point no] =
    28.3    29.4    36.2    36.3    36.4    37.1    37.3    37.4
 nstep=      39500

  Plastic element no [element no.Gauss point no] =
    28.3    29.4    36.2    36.3    36.4    37.1    37.3    37.4

nstep=      40000

  Plastic element no [element no.Gauss point no] =
    28.3    29.4    36.2    36.3    36.4    37.1    37.3    37.4
********* skip time step no. 40500 to 49500***********

 nstep=      50000

  Plastic element no [element no.Gauss point no] =
    27.3    28.1    28.2    28.3    28.4    29.1    29.2    29.3
    29.4    30.4    35.3    36.1    36.2    36.3    36.4    37.1
    37.2    37.3    37.4    38.4
********* skip time step no. 50500 to 59500***********
nstep=      60000

  Plastic element no [element no.Gauss point no] =
    20.2    20.3    20.4    21.1    21.3    21.4    27.2    27.3
    27.4    28.1    28.2    28.3    28.4    29.1    29.2    29.3
    29.4    30.1    30.3    30.4    35.2    35.3    35.4    36.1
    36.2    36.3    36.4    37.1    37.2    37.3    37.4    38.1
    38.3    38.4
********* skip time step no. 60500 to 161500***********

nstep=     161819

  Plastic element no =>[Element no.Gauss point no] =
    11.2    11.3    12.1    12.2    12.3    12.4    13.1    13.2
```

13.3	13.4	14.1	14.4	18.3	19.1	19.2	19.3
19.4	20.1	20.2	20.3	20.4	21.1	21.2	21.3
21.4	22.1	22.2	22.3	22.4	23.4	26.3	26.4
27.1	27.2	27.3	27.4	28.1	28.2	28.3	28.4
29.1	29.2	29.3	29.4	30.1	30.2	30.3	30.4
31.3	31.4	35.1	35.2	35.3	35.4	36.1	36.2
36.3	36.4	37.1	37.2	37.3	37.4	38.1	38.2
38.3	38.4						

card	21 stress seq.	output inf node#	ormation c ard d-(0),v-	(1),a-(2),	sig-(3)	x(1),y(2),	xy(3)
		1	37	0		2	
		2	38	0		2	
		3	39	0		2	
		4	40	0		2	
		5	41	0		2	
		6	42	0		2	
		7	43	0		2	
		8	44	0		2	
		9	45	0		2	
		10	42	3		2	
		11	43	3		2	
		12	44	3		2	
		13	45	3		2	
		14	37	3		2	
		15	38	3		2	
		16	39	3		2	
		17	40	3		2	
		18	41	3		2	
		19	42	3		3	
		20	43	3		3	
		21	44	3		3	
		22	45	3		3	
		23	37	3		3	
		24	38	3		3	
		25	39	3		3	
		26	40	3		3	
		27	41	3		3	
time	0.05	-3.4E-09	4.1E-08	-3.0E-06	-1.4E-05	-2.1E-05	-1.4E-05
		-3.0E-06	4.1E-08	-3.4E-09	-5.1E-04	-3.3E-03	-2.4E-03
		-2.5E-01	-5.1E-01	-2.5E-01	-2.4E-03	-3.3E-03	-5.1E-04
		1.5E-04	-4.5E-03	-2.1E-02	-2.7E-02	4.4E-17	2.7E-02
		2.1E-02	4.5E-03	-1.5E-04			
time	0.1	6.9E-08	-1.6E-07	-1.5E-05	-6.3E-05	-9.8E-05	-6.3E-05
		-1.5E-05	-1.6E-07	6.9E-08	-2.7E-03	-1.3E-02	-1.7E-02
		-7.2E-01	-1.4E+00	-7.2E-01	-1.7E-02	-1.3E-02	-2.7E-03
		-7.8E-04	-1.9E-02	-8.5E-02	-1.1E-01	-1.0E-16	1.1E-01
		8.5E-02	1.9E-02	7.8E-04			
time	0.15	3.6E-07	-1.5E-06	-3.6E-05	-1.4E-04	-2.2E-04	-1.4E-04
		-3.6E-05	-1.5E-06	3.6E-07	-4.8E-03	-2.4E-02	-4.5E-02
		-1.3E+00	-2.5E+00	-1.3E+00	-4.5E-02	-2.4E-02	-4.8E-03
		-6.4E-03	-4.2E-02	-1.8E-01	-2.3E-01	-9.7E-17	2.3E-01
		1.8E-01	4.2E-02	6.4E-03			
time	0.2	6.7E-07	-4.9E-06	-6.8E-05	-2.5E-04	-3.7E-04	-2.5E-04
		-6.8E-05	-4.9E-06	6.7E-07	-4.9E-03	-3.5E-02	-8.5E-02
		-1.8E+00	-3.6E+00	-1.8E+00	-8.5E-02	-3.5E-02	-4.9E-03
		-1.9E-02	-7.2E-02	-2.9E-01	-3.7E-01	4.2E-17	3.7E-01
		2.9E-01	7.2E-02	1.9E-02			
time	0.25	5.0E-07	-1.1E-05	-1.1E-04	-3.7E-04	-5.5E-04	-3.7E-04

		-1.1E-04	-1.1E-05	5.0E-07	-3.2E-03	-4.7E-02	-1.4E-01
		-2.5E+00	-4.7E+00	-2.5E+00	-1.4E-01	-4.7E-02	-3.2E-03
		-4.0E-02	-1.1E-01	-4.1E-01	-5.2E-01	5.0E-16	5.2E-01
		4.1E-01	1.1E-01	4.0E-02			
time	0.3	-7.7E-07	-2.0E-05	-1.6E-04	-5.2E-04	-7.5E-04	-5.2E-04
		-1.6E-04	-2.0E-05	-7.7E-07	-3.0E-04	-6.0E-02	-2.0E-01
		-3.1E+00	-5.9E+00	-3.1E+00	-2.0E-01	-6.0E-02	-3.0E-04
		-6.8E-02	-1.5E-01	-5.4E-01	-6.7E-01	4.7E-16	6.7E-01
		5.4E-01	1.5E-01	6.8E-02			
time	0.35	-3.7E-06	-3.3E-05	-2.2E-04	-6.7E-04	-9.6E-04	-6.7E-04
		-2.2E-04	-3.3E-05	-3.7E-06	2.7E-03	-7.5E-02	-2.7E-01
		-3.7E+00	-7.1E+00	-3.7E+00	-2.7E-01	-7.5E-02	2.7E-03
		-1.0E-01	-2.0E-01	-6.8E-01	-8.4E-01	-3.3E-16	8.4E-01
		6.8E-01	2.0E-01	1.0E-01			
time	0.4	-8.7E-06	-5.0E-05	-2.9E-04	-8.4E-04	-1.2E-03	-8.4E-04
		-2.9E-04	-5.0E-05	-8.7E-06	5.0E-03	-9.3E-02	-3.4E-01
		-4.4E+00	-8.3E+00	-4.4E+00	-3.4E-01	-9.3E-02	5.0E-03
		-1.4E-01	-2.5E-01	-8.3E-01	-1.0E+00	-5.6E-16	1.0E+00
		8.3E-01	2.5E-01	1.4E-01			
time	0.45	-1.6E-05	-7.0E-05	-3.7E-04	-1.0E-03	-1.4E-03	-1.0E-03
		-3.7E-04	-7.0E-05	-1.6E-05	5.9E-03	-1.1E-01	-4.3E-01
		-5.1E+00	-9.5E+00	-5.1E+00	-4.3E-01	-1.1E-01	5.9E-03
		-1.9E-01	-3.0E-01	-9.8E-01	-1.2E+00	-1.4E-15	1.2E+00
		9.8E-01	3.0E-01	1.9E-01			
time	0.5	-2.6E-05	-9.5E-05	-4.5E-04	-1.2E-03	-1.7E-03	-1.2E-03
		-4.5E-04	-9.5E-05	-2.6E-05	4.9E-03	-1.4E-01	-5.2E-01
		-5.8E+00	-1.1E+01	-5.8E+00	-5.2E-01	-1.4E-01	4.9E-03
		-2.4E-01	-3.6E-01	-1.1E+00	-1.4E+00	-5.6E-16	1.4E+00
		1.1E+00	3.6E-01	2.4E-01			
time	0.55	-3.9E-05	-1.2E-04	-5.4E-04	-1.4E-03	-2.0E-03	-1.4E-03
		-5.4E-04	-1.2E-04	-3.9E-05	1.8E-03	-1.7E-01	-6.1E-01
		-6.5E+00	-1.2E+01	-6.5E+00	-6.1E-01	-1.7E-01	1.8E-03
		-2.9E-01	-4.2E-01	-1.3E+00	-1.5E+00	1.1E-16	1.5E+00
		1.3E+00	4.2E-01	2.9E-01			
time	0.6	-5.4E-05	-1.5E-04	-6.3E-04	-1.6E-03	-2.2E-03	-1.6E-03
		-6.3E-04	-1.5E-04	-5.4E-05	-3.6E-03	-2.0E-01	-7.2E-01
		-7.2E+00	-1.3E+01	-7.2E+00	-7.2E-01	-2.0E-01	-3.6E-03
		-3.4E-01	-4.8E-01	-1.5E+00	-1.7E+00	-3.3E-16	1.7E+00
		1.5E+00	4.8E-01	3.4E-01			
time	0.65	-7.3E-05	-1.9E-04	-7.3E-04	-1.8E-03	-2.5E-03	-1.8E-03
		-7.3E-04	-1.9E-04	-7.3E-05	-1.1E-02	-2.3E-01	-8.2E-01
		-7.9E+00	-1.5E+01	-7.9E+00	-8.2E-01	-2.3E-01	-1.1E-02
		-4.0E-01	-5.4E-01	-1.6E+00	-1.9E+00	-4.6E-15	1.9E+00
		1.6E+00	5.4E-01	4.0E-01			
time	0.7	-9.4E-05	-2.3E-04	-8.3E-04	-2.1E-03	-2.8E-03	-2.1E-03
		-8.3E-04	-2.3E-04	-9.4E-05	-2.2E-02	-2.7E-01	-9.3E-01
		-8.6E+00	-1.6E+01	-8.6E+00	-9.3E-01	-2.7E-01	-2.2E-02
		-4.6E-01	-6.1E-01	-1.8E+00	-2.1E+00	-3.2E-15	2.1E+00
		1.8E+00	6.1E-01	4.6E-01			
time	0.75	-1.2E-04	-2.7E-04	-9.4E-04	-2.3E-03	-3.1E-03	-2.3E-03
		-9.4E-04	-2.7E-04	-1.2E-04	-3.4E-02	-3.0E-01	-1.1E+00

		-9.3E+00	-1.7E+01	-9.3E+00	-1.1E+00	-3.0E-01	-3.4E-02
		-5.2E-01	-6.7E-01	-2.0E+00	-2.3E+00	-6.8E-15	2.3E+00
		2.0E+00	6.7E-01	5.2E-01			
time	0.8	-1.4E-04	-3.1E-04	-1.1E-03	-2.5E-03	-3.4E-03	-2.5E-03
		-1.1E-03	-3.1E-04	-1.4E-04	-4.9E-02	-3.5E-01	-1.2E+00
		-1.0E+01	-1.8E+01	-1.0E+01	-1.2E+00	-3.5E-01	-4.9E-02
		-5.8E-01	-7.4E-01	-2.1E+00	-2.5E+00	-7.8E-15	2.5E+00
		2.1E+00	7.4E-01	5.8E-01			
time	0.85	-1.7E-04	-3.6E-04	-1.2E-03	-2.7E-03	-3.7E-03	-2.7E-03
		-1.2E-03	-3.6E-04	-1.7E-04	-6.6E-02	-3.9E-01	-1.3E+00
		-1.1E+01	-2.0E+01	-1.1E+01	-1.3E+00	-3.9E-01	-6.6E-02
		-6.5E-01	-8.0E-01	-2.3E+00	-2.6E+00	-3.9E-15	2.6E+00
		2.3E+00	8.0E-01	6.5E-01			
time	0.9	-2.0E-04	-4.1E-04	-1.3E-03	-3.0E-03	-4.0E-03	-3.0E-03
		-1.3E-03	-4.1E-04	-2.0E-04	-8.5E-02	-4.4E-01	-1.4E+00
		-1.2E+01	-2.1E+01	-1.2E+01	-1.4E+00	-4.4E-01	-8.5E-02
		-7.1E-01	-8.7E-01	-2.5E+00	-2.8E+00	-2.4E-15	2.8E+00
		2.5E+00	8.7E-01	7.1E-01			
time	0.95	-2.3E-04	-4.6E-04	-1.4E-03	-3.2E-03	-4.3E-03	-3.2E-03
		-1.4E-03	-4.6E-04	-2.3E-04	-1.1E-01	-4.9E-01	-1.5E+00
		-1.2E+01	-2.2E+01	-1.2E+01	-1.5E+00	-4.9E-01	-1.1E-01
		-7.7E-01	-9.4E-01	-2.6E+00	-3.0E+00	-7.4E-15	3.0E+00
		2.6E+00	9.4E-01	7.7E-01			
time	1	-2.7E-04	-5.1E-04	-1.5E-03	-3.4E-03	-4.6E-03	-3.4E-03
		-1.5E-03	-5.1E-04	-2.7E-04	-1.3E-01	-5.4E-01	-1.7E+00
		-1.3E+01	-2.4E+01	-1.3E+01	-1.7E+00	-5.4E-01	-1.3E-01
		-8.4E-01	-1.0E+00	-2.8E+00	-3.2E+00	-5.8E-15	3.2E+00
		2.8E+00	1.0E+00	8.4E-01			
time	1.05	-3.0E-04	-5.6E-04	-1.6E-03	-3.7E-03	-4.9E-03	-3.7E-03
		-1.6E-03	-5.6E-04	-3.0E-04	-1.5E-01	-5.9E-01	-1.8E+00
		-1.4E+01	-2.5E+01	-1.4E+01	-1.8E+00	-5.9E-01	-1.5E-01
		-9.0E-01	-1.1E+00	-3.0E+00	-3.4E+00	-4.2E-15	3.4E+00
		3.0E+00	1.1E+00	9.0E-01			
time	1.1	-3.4E-04	-6.2E-04	-1.8E-03	-3.9E-03	-5.2E-03	-3.9E-03
		-1.8E-03	-6.2E-04	-3.4E-04	-1.8E-01	-6.4E-01	-1.9E+00
		-1.5E+01	-2.6E+01	-1.5E+01	-1.9E+00	-6.4E-01	-1.8E-01
		-9.7E-01	-1.1E+00	-3.2E+00	-3.6E+00	1.8E-15	3.6E+00
		3.2E+00	1.1E+00	9.7E-01			
time	1.15	-3.8E-04	-6.8E-04	-1.9E-03	-4.2E-03	-5.6E-03	-4.2E-03
		-1.9E-03	-6.8E-04	-3.8E-04	-2.1E-01	-7.0E-01	-2.1E+00
		-1.5E+01	-2.8E+01	-1.5E+01	-2.1E+00	-7.0E-01	-2.1E-01
		-1.0E+00	-1.2E+00	-3.3E+00	-3.8E+00	-1.6E-15	3.8E+00
		3.3E+00	1.2E+00	1.0E+00			
time	1.2	-4.2E-04	-7.4E-04	-2.0E-03	-4.4E-03	-5.9E-03	-4.4E-03
		-2.0E-03	-7.4E-04	-4.2E-04	-2.3E-01	-7.6E-01	-2.2E+00
		-1.6E+01	-2.9E+01	-1.6E+01	-2.2E+00	-7.6E-01	-2.3E-01
		-1.1E+00	-1.3E+00	-3.5E+00	-4.0E+00	-1.4E-14	4.0E+00
		3.5E+00	1.3E+00	1.1E+00			
time	1.25	-4.6E-04	-8.0E-04	-2.2E-03	-4.7E-03	-6.2E-03	-4.7E-03
		-2.2E-03	-8.0E-04	-4.6E-04	-2.6E-01	-8.1E-01	-2.3E+00
		-1.7E+01	-3.0E+01	-1.7E+01	-2.3E+00	-8.1E-01	-2.6E-01

		-1.2E+00	-1.3E+00	-3.7E+00	-4.2E+00	-1.6E-14	4.2E+00
		3.7E+00	1.3E+00	1.2E+00			
time	1.3	-5.1E-04	-8.6E-04	-2.3E-03	-4.9E-03	-6.5E-03	-4.9E-03
		-2.3E-03	-8.6E-04	-5.1E-04	-3.0E-01	-8.7E-01	-2.5E+00
		-1.8E+01	-3.1E+01	-1.8E+01	-2.5E+00	-8.7E-01	-3.0E-01
		-1.2E+00	-1.4E+00	-3.9E+00	-4.3E+00	-1.4E-14	4.3E+00
		3.9E+00	1.4E+00	1.2E+00			
time	1.35	-5.5E-04	-9.2E-04	-2.4E-03	-5.2E-03	-6.8E-03	-5.2E-03
		-2.4E-03	-9.2E-04	-5.5E-04	-3.3E-01	-9.3E-01	-2.6E+00
		-1.8E+01	-3.3E+01	-1.8E+01	-2.6E+00	-9.3E-01	-3.3E-01
		-1.3E+00	-1.5E+00	-4.0E+00	-4.5E+00	-1.3E-14	4.5E+00
		4.0E+00	1.5E+00	1.3E+00			
time	1.4	-5.9E-04	-9.9E-04	-2.6E-03	-5.4E-03	-7.2E-03	-5.4E-03
		-2.6E-03	-9.9E-04	-5.9E-04	-3.6E-01	-9.9E-01	-2.8E+00
		-1.9E+01	-3.4E+01	-1.9E+01	-2.8E+00	-9.9E-01	-3.6E-01
		-1.4E+00	-1.6E+00	-4.2E+00	-4.7E+00	-1.5E-14	4.7E+00
		4.2E+00	1.6E+00	1.4E+00			
time	1.45	-6.4E-04	-1.1E-03	-2.7E-03	-5.7E-03	-7.5E-03	-5.7E-03
		-2.7E-03	-1.1E-03	-6.4E-04	-3.9E-01	-1.1E+00	-2.9E+00
		-2.0E+01	-3.5E+01	-2.0E+01	-2.9E+00	-1.1E+00	-3.9E-01
		-1.4E+00	-1.6E+00	-4.4E+00	-4.9E+00	-1.3E-14	4.9E+00
		4.4E+00	1.6E+00	1.4E+00			
time	1.5	-6.9E-04	-1.1E-03	-2.8E-03	-6.0E-03	-7.8E-03	-6.0E-03
		-2.8E-03	-1.1E-03	-6.9E-04	-4.3E-01	-1.1E+00	-3.1E+00
		-2.1E+01	-3.7E+01	-2.1E+01	-3.1E+00	-1.1E+00	-4.3E-01
		-1.5E+00	-1.7E+00	-4.5E+00	-5.1E+00	-1.6E-14	5.1E+00
		4.5E+00	1.7E+00	1.5E+00			
time	1.55	-7.3E-04	-1.2E-03	-3.0E-03	-6.2E-03	-8.1E-03	-6.2E-03
		-3.0E-03	-1.2E-03	-7.3E-04	-4.6E-01	-1.2E+00	-3.2E+00
		-2.1E+01	-3.8E+01	-2.1E+01	-3.2E+00	-1.2E+00	-4.6E-01
		-1.6E+00	-1.8E+00	-4.7E+00	-5.3E+00	-9.1E-15	5.3E+00
		4.7E+00	1.8E+00	1.6E+00			
time	1.6	-7.8E-04	-1.3E-03	-3.1E-03	-6.5E-03	-8.5E-03	-6.5E-03
		-3.1E-03	-1.3E-03	-7.8E-04	-5.0E-01	-1.3E+00	-3.3E+00
		-2.2E+01	-3.9E+01	-2.2E+01	-3.3E+00	-1.3E+00	-5.0E-01
		-1.6E+00	-1.8E+00	-4.9E+00	-5.5E+00	-2.3E-14	5.5E+00
		4.9E+00	1.8E+00	1.6E+00			
time	1.65	-8.3E-04	-1.3E-03	-3.2E-03	-6.7E-03	-8.8E-03	-6.7E-03
		-3.2E-03	-1.3E-03	-8.3E-04	-5.4E-01	-1.3E+00	-3.5E+00
		-2.3E+01	-4.1E+01	-2.3E+01	-3.5E+00	-1.3E+00	-5.4E-01
		-1.7E+00	-1.9E+00	-5.1E+00	-5.7E+00	-1.6E-14	5.7E+00
		5.1E+00	1.9E+00	1.7E+00			
time	1.7	-8.8E-04	-1.4E-03	-3.4E-03	-7.0E-03	-9.1E-03	-7.0E-03
		-3.4E-03	-1.4E-03	-8.8E-04	-5.7E-01	-1.4E+00	-3.6E+00
		-2.4E+01	-4.2E+01	-2.4E+01	-3.6E+00	-1.4E+00	-5.7E-01
		-1.8E+00	-2.0E+00	-5.2E+00	-5.9E+00	-2.0E-14	5.9E+00
		5.2E+00	2.0E+00	1.8E+00			
time	1.75	-9.3E-04	-1.5E-03	-3.5E-03	-7.2E-03	-9.5E-03	-7.2E-03
		-3.5E-03	-1.5E-03	-9.3E-04	-6.1E-01	-1.4E+00	-3.8E+00
		-2.4E+01	-4.3E+01	-2.4E+01	-3.8E+00	-1.4E+00	-6.1E-01
		-1.8E+00	-2.0E+00	-5.4E+00	-6.1E+00	-3.1E-14	6.1E+00

		5.4E+00	2.0E+00	1.8E+00			
time	1.8	-9.7E-04	-1.5E-03	-3.7E-03	-7.5E-03	-9.8E-03	-7.5E-03
		-3.7E-03	-1.5E-03	-9.7E-04	-6.5E-01	-1.5E+00	-3.9E+00
		-2.5E+01	-4.5E+01	-2.5E+01	-3.9E+00	-1.5E+00	-6.5E-01
		-1.9E+00	-2.1E+00	-5.6E+00	-6.2E+00	-4.4E-14	6.2E+00
		5.6E+00	2.1E+00	1.9E+00			
time	1.85	-1.0E-03	-1.6E-03	-3.8E-03	-7.8E-03	-1.0E-02	-7.8E-03
		-3.8E-03	-1.6E-03	-1.0E-03	-6.8E-01	-1.6E+00	-4.1E+00
		-2.6E+01	-4.6E+01	-2.6E+01	-4.1E+00	-1.6E+00	-6.8E-01
		-2.0E+00	-2.2E+00	-5.8E+00	-6.4E+00	-3.6E-14	6.4E+00
		5.8E+00	2.2E+00	2.0E+00			
time	1.9	-1.1E-03	-1.7E-03	-3.9E-03	-8.0E-03	-1.0E-02	-8.0E-03
		-3.9E-03	-1.7E-03	-1.1E-03	-7.2E-01	-1.6E+00	-4.2E+00
		-2.7E+01	-4.7E+01	-2.7E+01	-4.2E+00	-1.6E+00	-7.2E-01
		-2.0E+00	-2.2E+00	-5.9E+00	-6.6E+00	-2.3E-14	6.6E+00
		5.9E+00	2.2E+00	2.0E+00			
time	1.95	-1.1E-03	-1.7E-03	-4.1E-03	-8.3E-03	-1.1E-02	-8.3E-03
		-4.1E-03	-1.7E-03	-1.1E-03	-7.6E-01	-1.7E+00	-4.4E+00
		-2.7E+01	-4.9E+01	-2.7E+01	-4.4E+00	-1.7E+00	-7.6E-01
		-2.1E+00	-2.3E+00	-6.1E+00	-6.8E+00	-2.8E-14	6.8E+00
		6.1E+00	2.3E+00	2.1E+00			
time	2	-1.2E-03	-1.8E-03	-4.2E-03	-8.6E-03	-1.1E-02	-8.6E-03
		-4.2E-03	-1.8E-03	-1.2E-03	-8.0E-01	-1.8E+00	-4.5E+00
		-2.8E+01	-5.0E+01	-2.8E+01	-4.5E+00	-1.8E+00	-8.0E-01
		-2.2E+00	-2.4E+00	-6.3E+00	-7.0E+00	-4.0E-14	7.0E+00
		6.3E+00	2.4E+00	2.2E+00			
time	2.05	-1.2E-03	-1.9E-03	-4.4E-03	-8.8E-03	-1.1E-02	-8.8E-03
		-4.4E-03	-1.9E-03	-1.2E-03	-8.4E-01	-1.8E+00	-4.7E+00
		-2.9E+01	-5.1E+01	-2.9E+01	-4.7E+00	-1.8E+00	-8.4E-01
		-2.2E+00	-2.4E+00	-6.5E+00	-7.2E+00	-6.0E-14	7.2E+00
		6.5E+00	2.4E+00	2.2E+00			
time	2.1	-1.3E-03	-1.9E-03	-4.5E-03	-9.1E-03	-1.2E-02	-9.1E-03
		-4.5E-03	-1.9E-03	-1.3E-03	-8.8E-01	-1.9E+00	-4.8E+00
		-3.0E+01	-5.3E+01	-3.0E+01	-4.8E+00	-1.9E+00	-8.8E-01
		-2.3E+00	-2.5E+00	-6.6E+00	-7.4E+00	-7.9E-14	7.4E+00
		6.6E+00	2.5E+00	2.3E+00			
time	2.15	-1.3E-03	-2.0E-03	-4.6E-03	-9.3E-03	-1.2E-02	-9.3E-03
		-4.6E-03	-2.0E-03	-1.3E-03	-9.2E-01	-2.0E+00	-5.0E+00
		-3.0E+01	-5.4E+01	-3.0E+01	-5.0E+00	-2.0E+00	-9.2E-01
		-2.4E+00	-2.6E+00	-6.8E+00	-7.6E+00	-6.6E-14	7.6E+00
		6.8E+00	2.6E+00	2.4E+00			
time	2.2	-1.4E-03	-2.1E-03	-4.8E-03	-9.6E-03	-1.2E-02	-9.6E-03
		-4.8E-03	-2.1E-03	-1.4E-03	-9.6E-01	-2.1E+00	-5.1E+00
		-3.1E+01	-5.5E+01	-3.1E+01	-5.1E+00	-2.1E+00	-9.6E-01
		-2.4E+00	-2.6E+00	-7.0E+00	-7.8E+00	-5.7E-14	7.8E+00
		7.0E+00	2.6E+00	2.4E+00			
time	2.25	-1.4E-03	-2.2E-03	-4.9E-03	-9.9E-03	-1.3E-02	-9.9E-03
		-4.9E-03	-2.2E-03	-1.4E-03	-1.0E+00	-2.1E+00	-5.3E+00
		-3.2E+01	-5.7E+01	-3.2E+01	-5.3E+00	-2.1E+00	-1.0E+00
		-2.5E+00	-2.7E+00	-7.1E+00	-8.0E+00	-7.2E-14	8.0E+00
		7.1E+00	2.7E+00	2.5E+00			

time	2.3	-1.5E-03	-2.2E-03	-5.1E-03	-1.0E-02	-1.3E-02	-1.0E-02
		-5.1E-03	-2.2E-03	-1.5E-03	-1.0E+00	-2.2E+00	-5.4E+00
		-3.3E+01	-5.8E+01	-3.3E+01	-5.4E+00	-2.2E+00	-1.0E+00
		-2.6E+00	-2.8E+00	-7.3E+00	-8.2E+00	-6.1E-14	8.2E+00
		7.3E+00	2.8E+00	2.6E+00			
time	2.35	-1.5E-03	-2.3E-03	-5.2E-03	-1.0E-02	-1.3E-02	-1.0E-02
		-5.2E-03	-2.3E-03	-1.5E-03	-1.1E+00	-2.3E+00	-5.5E+00
		-3.3E+01	-5.9E+01	-3.3E+01	-5.5E+00	-2.3E+00	-1.1E+00
		-2.6E+00	-2.9E+00	-7.5E+00	-8.3E+00	-4.6E-14	8.3E+00
		7.5E+00	2.9E+00	2.6E+00			
time	2.4	-1.6E-03	-2.4E-03	-5.3E-03	-1.1E-02	-1.4E-02	-1.1E-02
		-5.3E-03	-2.4E-03	-1.6E-03	-1.1E+00	-2.3E+00	-5.7E+00
		-3.4E+01	-6.1E+01	-3.4E+01	-5.7E+00	-2.3E+00	-1.1E+00
		-2.7E+00	-2.9E+00	-7.7E+00	-8.5E+00	-5.0E-14	8.5E+00
		7.7E+00	2.9E+00	2.7E+00			
time	2.45	-1.6E-03	-2.4E-03	-5.5E-03	-1.1E-02	-1.4E-02	-1.1E-02
		-5.5E-03	-2.4E-03	-1.6E-03	-1.2E+00	-2.4E+00	-5.8E+00
		-3.5E+01	-6.2E+01	-3.5E+01	-5.8E+00	-2.4E+00	-1.2E+00
		-2.8E+00	-3.0E+00	-7.8E+00	-8.7E+00	-5.5E-14	8.7E+00
		7.8E+00	3.0E+00	2.8E+00			
time	2.5	-1.7E-03	-2.5E-03	-5.6E-03	-1.1E-02	-1.4E-02	-1.1E-02
		-5.6E-03	-2.5E-03	-1.7E-03	-1.2E+00	-2.5E+00	-6.0E+00
		-3.6E+01	-6.3E+01	-3.6E+01	-6.0E+00	-2.5E+00	-1.2E+00
		-2.8E+00	-3.1E+00	-8.0E+00	-8.9E+00	-6.4E-14	8.9E+00
		8.0E+00	3.1E+00	2.8E+00			
time	2.55	-1.8E-03	-2.6E-03	-5.8E-03	-1.1E-02	-1.5E-02	-1.1E-02
		-5.8E-03	-2.6E-03	-1.8E-03	-1.2E+00	-2.5E+00	-6.1E+00
		-3.6E+01	-6.5E+01	-3.6E+01	-6.1E+00	-2.5E+00	-1.2E+00
		-2.9E+00	-3.1E+00	-8.2E+00	-9.1E+00	-8.4E-14	9.1E+00
		8.2E+00	3.1E+00	2.9E+00			
time	2.6	-1.8E-03	-2.7E-03	-5.9E-03	-1.2E-02	-1.5E-02	-1.2E-02
		-5.9E-03	-2.7E-03	-1.8E-03	-1.3E+00	-2.6E+00	-6.3E+00
		-3.7E+01	-6.6E+01	-3.7E+01	-6.3E+00	-2.6E+00	-1.3E+00
		-3.0E+00	-3.2E+00	-8.4E+00	-9.3E+00	-6.4E-14	9.3E+00
		8.4E+00	3.2E+00	3.0E+00			
time	2.65	-1.9E-03	-2.7E-03	-6.1E-03	-1.2E-02	-1.5E-02	-1.2E-02
		-6.1E-03	-2.7E-03	-1.9E-03	-1.3E+00	-2.7E+00	-6.4E+00
		-3.8E+01	-6.7E+01	-3.8E+01	-6.4E+00	-2.7E+00	-1.3E+00
		-3.0E+00	-3.3E+00	-8.5E+00	-9.5E+00	-6.5E-14	9.5E+00
		8.5E+00	3.3E+00	3.0E+00			
time	2.7	-1.9E-03	-2.8E-03	-6.2E-03	-1.2E-02	-1.6E-02	-1.2E-02
		-6.2E-03	-2.8E-03	-1.9E-03	-1.4E+00	-2.7E+00	-6.6E+00
		-3.9E+01	-6.8E+01	-3.9E+01	-6.6E+00	-2.7E+00	-1.4E+00
		-3.1E+00	-3.3E+00	-8.7E+00	-9.7E+00	-6.2E-14	9.7E+00
		8.7E+00	3.3E+00	3.1E+00			
time	2.75	-2.0E-03	-2.9E-03	-6.3E-03	-1.3E-02	-1.6E-02	-1.3E-02
		-6.3E-03	-2.9E-03	-2.0E-03	-1.4E+00	-2.8E+00	-6.7E+00
		-3.9E+01	-7.0E+01	-3.9E+01	-6.7E+00	-2.8E+00	-1.4E+00
		-3.2E+00	-3.4E+00	-8.9E+00	-9.9E+00	-9.8E-14	9.9E+00
		8.9E+00	3.4E+00	3.2E+00			
time	2.8	-2.0E-03	-2.9E-03	-6.5E-03	-1.3E-02	-1.6E-02	-1.3E-02

		-6.5E-03	-2.9E-03	-2.0E-03	-1.4E+00	-2.9E+00	-6.9E+00
		-4.0E+01	-7.2E+01	-4.0E+01	-6.9E+00	-2.9E+00	-1.4E+00
		-3.2E+00	-3.5E+00	-9.0E+00	-1.0E+01	-1.1E-13	1.0E+01
		9.0E+00	3.5E+00	3.2E+00			
time	2.85	-2.1E-03	-3.0E-03	-6.6E-03	-1.3E-02	-1.7E-02	-1.3E-02
		-6.6E-03	-3.0E-03	-2.1E-03	-1.5E+00	-2.9E+00	-7.0E+00
		-4.1E+01	-7.4E+01	-4.1E+01	-7.0E+00	-2.9E+00	-1.5E+00
		-3.3E+00	-3.5E+00	-9.2E+00	-1.0E+01	-1.2E-13	1.0E+01
		9.2E+00	3.5E+00	3.3E+00			
time	2.9	-2.1E-03	-3.1E-03	-6.8E-03	-1.3E-02	-1.7E-02	-1.3E-02
		-6.8E-03	-3.1E-03	-2.1E-03	-1.5E+00	-3.0E+00	-7.2E+00
		-4.1E+01	-7.6E+01	-4.1E+01	-7.2E+00	-3.0E+00	-1.5E+00
		-3.4E+00	-3.6E+00	-9.4E+00	-1.0E+01	-1.4E-13	1.0E+01
		9.4E+00	3.6E+00	3.4E+00			
time	2.95	-2.2E-03	-3.2E-03	-6.9E-03	-1.4E-02	-1.7E-02	-1.4E-02
		-6.9E-03	-3.2E-03	-2.2E-03	-1.6E+00	-3.1E+00	-7.3E+00
		-4.2E+01	-7.8E+01	-4.2E+01	-7.3E+00	-3.1E+00	-1.6E+00
		-3.4E+00	-3.7E+00	-9.6E+00	-1.1E+01	-1.5E-13	1.1E+01
		9.6E+00	3.7E+00	3.4E+00			
time	3	-2.2E-03	-3.2E-03	-7.0E-03	-1.4E-02	-1.8E-02	-1.4E-02
		-7.0E-03	-3.2E-03	-2.2E-03	-1.6E+00	-3.2E+00	-7.5E+00
		-4.3E+01	-7.9E+01	-4.3E+01	-7.5E+00	-3.2E+00	-1.6E+00
		-3.5E+00	-3.7E+00	-9.8E+00	-1.1E+01	-1.4E-13	1.1E+01
		9.8E+00	3.7E+00	3.5E+00			
time	3.05	-2.3E-03	-3.3E-03	-7.2E-03	-1.4E-02	-1.8E-02	-1.4E-02
		-7.2E-03	-3.3E-03	-2.3E-03	-1.7E+00	-3.2E+00	-7.6E+00
		-4.4E+01	-8.0E+01	-4.4E+01	-7.6E+00	-3.2E+00	-1.7E+00
		-3.6E+00	-3.8E+00	-9.9E+00	-1.1E+01	-1.2E-13	1.1E+01
		9.9E+00	3.8E+00	3.6E+00			
time	3.1	-2.3E-03	-3.4E-03	-7.3E-03	-1.4E-02	-1.8E-02	-1.4E-02
		-7.3E-03	-3.4E-03	-2.3E-03	-1.7E+00	-3.3E+00	-7.8E+00
		-4.5E+01	-8.1E+01	-4.5E+01	-7.8E+00	-3.3E+00	-1.7E+00
		-3.6E+00	-3.9E+00	-1.0E+01	-1.1E+01	-1.3E-13	1.1E+01
		1.0E+01	3.9E+00	3.6E+00			
time	3.15	-2.4E-03	-3.5E-03	-7.5E-03	-1.5E-02	-1.9E-02	-1.5E-02
		-7.5E-03	-3.5E-03	-2.4E-03	-1.7E+00	-3.4E+00	-8.0E+00
		-4.5E+01	-8.2E+01	-4.5E+01	-8.0E+00	-3.4E+00	-1.7E+00
		-3.7E+00	-3.9E+00	-1.0E+01	-1.1E+01	-1.2E-13	1.1E+01
		1.0E+01	3.9E+00	3.7E+00			
time	3.2	-2.4E-03	-3.5E-03	-7.6E-03	-1.5E-02	-1.9E-02	-1.5E-02
		-7.6E-03	-3.5E-03	-2.4E-03	-1.8E+00	-3.4E+00	-8.1E+00
		-4.6E+01	-8.3E+01	-4.6E+01	-8.1E+00	-3.4E+00	-1.8E+00
		-3.8E+00	-4.0E+00	-1.1E+01	-1.2E+01	-1.4E-13	1.2E+01
		1.1E+01	4.0E+00	3.8E+00			
time	3.25	-2.5E-03	-3.6E-03	-7.7E-03	-1.5E-02	-1.9E-02	-1.5E-02
		-7.7E-03	-3.6E-03	-2.5E-03	-1.8E+00	-3.5E+00	-8.3E+00
		-4.7E+01	-8.4E+01	-4.7E+01	-8.3E+00	-3.5E+00	-1.8E+00
		-3.8E+00	-4.1E+00	-1.1E+01	-1.2E+01	-9.8E-14	1.2E+01
		1.1E+01	4.1E+00	3.8E+00			

time	4	-3.3E-03	-4.7E-03	-9.9E-03	-1.9E-02	-2.4E-02	-1.9E-02
		-9.9E-03	-4.7E-03	-3.3E-03	-2.5E+00	-4.6E+00	-1.1E+01
		-6.1E+01	-1.0E+02	-6.1E+01	-1.1E+01	-4.6E+00	-2.5E+00
		-4.8E+00	-5.1E+00	-1.3E+01	-1.6E+01	-3.6E-15	1.6E+01
		1.3E+01	5.1E+00	4.8E+00			
time	5	-4.4E-03	-6.1E-03	-1.3E-02	-2.4E-02	-3.4E-02	-2.4E-02
		-1.3E-02	-6.1E-03	-4.4E-03	-3.4E+00	-6.1E+00	-1.4E+01
		-7.2E+01	-1.2E+02	-7.2E+01	-1.4E+01	-6.1E+00	-3.4E+00
		-6.0E+00	-6.6E+00	-1.8E+01	-2.1E+01	-2.7E-14	2.1E+01
		1.8E+01	6.6E+00	6.0E+00			
time	6	-5.4E-03	-7.4E-03	-1.5E-02	-3.1E-02	-4.7E-02	-3.1E-02
		-1.5E-02	-7.4E-03	-5.4E-03	-4.2E+00	-7.3E+00	-1.8E+01
		-8.3E+01	-1.5E+02	-8.3E+01	-1.8E+01	-7.3E+00	-4.2E+00
		-6.9E+00	-7.9E+00	-2.3E+01	-2.5E+01	-8.3E-14	2.5E+01
		2.3E+01	7.9E+00	6.9E+00			
time	16.18	-6.9E-03	-9.4E-03	-2.0E-02	-5.4E-02	-9.1E-02	-5.4E-02
		-2.0E-02	-9.4E-03	-6.9E-03	-5.1E+00	-9.1E+00	-2.7E+01
		-1.0E+02	-2.1E+02	-1.0E+02	-2.7E+01	-9.1E+00	-5.1E+00
		-8.6E+00	-1.1E+01	-2.8E+01	-3.5E+01	-4.7E-13	3.5E+01
		2.8E+01	1.1E+01	8.6E+00			

Input and output of ANSYS

S O L U T I O N O P T I O N S

PROBLEM DIMENSIONALITY. 2-D
DEGREES OF FREEDOM. . . . . UX UY
ANALYSIS TYPE . . . . . .STATIC (STEADY-STATE)
PLASTIC MATERIAL PROPERTIES INCLUDED. . . . . .YES
NEWTON-RAPHSON OPTION . . . . . .PROGRAM CHOSEN
ADAPTIVE DESCENT OPTION . . . . . .ON

L O A D S T E P O P T I O N S

LOAD STEP NUMBER. 2
TIME AT END OF THE LOAD STEP. 7.5000
AUTOMATIC TIME STEPPING . . . . . ON
   INITIAL NUMBER OF SUBSTEPS 10
   MAXIMUM NUMBER OF SUBSTEPS 100
   MINIMUM NUMBER OF SUBSTEPS 1
MAXIMUM NUMBER OF EQUILIBRIUM ITERATIONS. . . . 25
STEP CHANGE BOUNDARY CONDITIONS . . . . . NO
TERMINATE ANALYSIS IF NOT CONVERGED . . . . . .YES (REMAIN)
CONVERGENCE CONTROLS. . . . . .USE DEFAULTS
COPY INTEGRATION POINT VALUES TO NODE . . . . .YES, FOR ELEMENTS WITH
ACTIVE MAT. NONLINEARITIES

PRINT OUTPUT CONTROLS
   ITEM FREQUENCY COMPONENT
   BASI ALL
DATABASE OUTPUT CONTROLS. . . . . .ALL DATA WRITTEN
FOR THE LAST SUBSTEP

LIST ALL SELECTED ELEMENTS. (LIST NODES)

ELEM	MAT	TYP	REL	ESY	NODES			
1	1	1	1	0	1	2	11	10
2	1	1	1	0	2	3	12	11
3	1	1	1	0	3	4	13	12
4	1	1	1	0	4	5	14	13
5	1	1	1	0	5	6	15	14
6	1	1	1	0	6	7	16	15
7	1	1	1	0	7	8	17	16
8	1	1	1	0	8	9	18	17
9	1	1	1	0	10	11	20	19
10	1	1	1	0	11	12	21	20
11	1	1	1	0	12	13	22	21
12	1	1	1	0	13	14	23	22
13	1	1	1	0	14	15	24	23
14	1	1	1	0	15	16	25	24
15	1	1	1	0	16	17	26	25
16	1	1	1	0	17	18	27	26
17	1	1	1	0	19	20	29	28
18	1	1	1	0	20	21	30	29
19	1	1	1	0	21	22	31	30
21	1	1	1	0	22	23	32	31

ELEM	MAT	TYP	REL	ESY	NODES			
22	1	1	1	0	23	24	33	32
23	1	1	1	0	24	25	34	33
24	1	1	1	0	25	26	35	34
25	1	1	1	0	26	27	36	35
26	1	1	1	0	28	29	38	37
27	1	1	1	0	29	30	39	38
28	1	1	1	0	30	31	40	39
29	1	1	1	0	31	32	41	40
30	1	1	1	0	32	33	42	41
31	1	1	1	0	33	34	43	42
32	1	1	1	0	34	35	44	43
33	1	1	1	0	35	36	45	44
34	1	1	1	0	37	38	47	46
35	1	1	1	0	38	39	48	47
36	1	1	1	0	39	40	49	48
37	1	1	1	0	40	41	50	49
38	1	1	1	0	41	42	51	50
39	1	1	1	0	42	43	52	51
40	1	1	1	0	43	44	53	52
41	1	1	1	0	44	45	54	53

LIST NODAL FORCES FOR SELECTED NODES 1 TO 54 BY
CURRENTLY SELECTED NODAL LOAD SET= FX FY

NODE	LABEL	REAL	IMAG
49	FY	-50.0000000	0.
50	FY	-100.000000	0.
51	FY	-50.0000000	0.

PRINT DOF NODAL SOLUTION PER NODE

***** POST1 NODAL DEGREE OF FREEDOM LISTING *****

LOAD STEP= 1 SUBSTEP= 7
TIME= 7.5000 LOAD CASE= 0

THE FOLLOWING DEGREE OF FREEDOM RESULTS ARE IN GLOBAL COORDINATES

NODE	UX	UY
1	0.	0.
2	0.	0.
3	0.	0.
4	0.	0.
5	0.	0.
6	0.	0.
7	0.	0.
8	0.	0.
9	0.	0.
10	0.	-0.35661E-02
11	-0.12587E-02	-0.40430E-02
12	-0.17317E-02	-0.51145E-02
13	-0.11812E-02	-0.60701E-02
14	-0.11570E-18	-0.64232E-02
15	0.11812E-02	-0.60701E-02
16	0.17317E-02	-0.51145E-02
17	0.12587E-02	-0.40430E-02
18	0.	-0.35661E-02
19	0.	-0.57923E-02
20	-0.25390E-02	-0.70917E-02
21	-0.36822E-02	-0.10298E-01
22	-0.26818E-02	-0.13074E-01
23	0.85677E-18	-0.14168E-01
24	0.26818E-02	-0.13074E-01
25	0.36822E-02	-0.10298E-01
26	0.25390E-02	-0.70917E-02
27	0.	-0.57923E-02
28	0.	-0.59395E-02
29	-0.40087E-02	-0.85881E-02
30	-0.65065E-02	-0.14872E-01
31	-0.50781E-02	-0.23970E-01
32	0.21870E-17	-0.27690E-01
33	0.50781E-02	-0.23970E-01
34	0.65065E-02	-0.14872E-01
35	0.40087E-02	-0.85881E-02
36	0.	-0.59395E-02
37	0.	-0.54541E-02

***** POST1 NODAL DEGREE OF FREEDOM LISTING *****

LOAD STEP= 1 SUBSTEP= 7
TIME= 7.5000 LOAD CASE= 0

THE FOLLOWING DEGREE OF FREEDOM RESULTS ARE IN GLOBAL COORDINATES

NODE	UX	UY
38	-0.20858E-02	-0.73995E-02
39	-0.83598E-02	-0.17202E-01
40	-0.20669E-01	-0.56733E-01
41	0.10215E-17	-0.95031E-01
42	0.20669E-01	-0.56733E-01
43	0.83598E-02	-0.17202E-01
44	0.20858E-02	-0.73995E-02
45	0.	-0.54541E-02
46	0.	-0.53647E-02

```
    47  0.27519E-02-0.74465E-02
    48  0.86495E-02-0.15788E-01
    49  0.20318E-01-0.86526E-01
    50  0.39455E-17-0.28381
    51 -0.20318E-01-0.86526E-01
    52 -0.86495E-02-0.15788E-01
    53 -0.27519E-02-0.74465E-02
    54        0.    -0.53647E-02

MAXIMUM ABSOLUTE VALUES
NODE        40          50
VALUE  -0.20669E-01-0.28381
```

PRINT S NODAL SOLUTION PER NODE

***** POST1 NODAL STRESS LISTING *****

LOAD STEP= 1 SUBSTEP= 7
TIME= 7.5000 LOAD CASE= 0

THE FOLLOWING X,Y,Z VALUES ARE IN GLOBAL COORDINATES

NODE	SX	SY	SZ	SXY	SYZ	SXZ
1	-11.848	-37.348	0.	-3.0041	0.	0.
2	-12.822	-41.403	0.	-5.0172	0.	0.
3	-15.072	-50.500	0.	-6.8628	0.	0.
4	-17.178	-58.615	0.	-4.6755	0.	0.
5	-18.008	-61.617	0.	0.	0.	0.
6	-17.178	-58.615	0.	4.6755	0.	0.
7	-15.072	-50.500	0.	6.8628	0.	0.
8	-12.822	-41.403	0.	5.0172	0.	0.
9	-11.848	-37.348	0.	3.0041	0.	0.
10	-22.011	-32.683	0.	-4.1472	0.	0.
11	-19.816	-37.931	0.	-7.0802	0.	0.
12	-14.768	-50.874	0.	-9.7884	0.	0.
13	-10.184	-61.816	0.	-6.7208	0.	0.
14	-8.4540	-66.075	0.	0.	0.	0.
15	-10.184	-61.816	0.	6.7208	0.	0.
16	-14.768	-50.874	0.	9.7884	0.	0.
17	-19.816	-37.931	0.	7.0802	0.	0.
18	-22.011	-32.683	0.	4.1472	0.	0.
19	-30.285	-19.894	0.	-7.3335	0.	0.
20	-26.177	-28.601	0.	-12.880	0.	0.
21	-16.299	-52.062	0.	-18.768	0.	0.
22	-5.3554	-71.136	0.	-13.072	0.	0.
23	-0.24539	-76.398	0.	0.	0.	0.
24	-5.3554	-71.136	0.	13.072	0.	0.
25	-16.299	-52.062	0.	18.768	0.	0.
26	-26.177	-28.601	0.	12.880	0.	0.
27	-30.285	-19.894	0.	7.3335	0.	0.
28	-38.869	-7.8486	0.	-7.0000	0.	0.
29	-34.731	-11.477	0.	-16.395	0.	0.
30	-27.076	-50.747	0.	-28.362	0.	0.
31	-23.025	-85.023	0.	-22.088	0.	0.
32	-18.585	-97.637	0.	0.	0.	0.
33	-23.025	-85.023	0.	22.088	0.	0.
34	-27.076	-50.747	0.	28.362	0.	0.
35	-34.731	-11.477	0.	16.395	0.	0.
36	-38.869	-7.8486	0.	7.0000	0.	0.
37	-18.707	-1.0578	0.	-1.6103	0.	0.

***** POST1 NODAL STRESS LISTING *****

LOAD STEP= 1 SUBSTEP= 7
TIME= 7.5000 LOAD CASE= 0

THE FOLLOWING X,Y,Z VALUES ARE IN GLOBAL COORDINATES

NODE	SX	SY	SZ	SXY	SYZ	SXZ
38	-38.521	-0.52470E-01	0.	-6.1338	0.	0.
39	-62.368	-31.236	0.	-22.425	0.	0.
40	-45.676	-95.781	0.	-31.750	0.	0.
41	-39.889	-144.79	0.	0.	0.	0.
42	-45.676	-95.781	0.	31.750	0.	0.
43	-62.368	-31.236	0.	22.425	0.	0.
44	-38.521	-0.52470E-01	0.	6.1338	0.	0.
45	-18.707	-1.0578	0.	1.6103	0.	0.
46	25.127	1.8117	0.	1.4027	0.	0.

47	40.033	0.10640	0.	3.9054	0.
48	33.416	-16.146	0.	-14.967	0.
49	-47.999	-95.595	0.	-34.471	0.
50	-85.862	-178.55	0.	0.	0.
51	-47.999	-95.595	0.	34.471	0.
52	33.416	-16.146	0.	14.967	0.
53	40.033	0.10640	0.	-3.9054	0.
54	25.127	1.8117	0.	-1.4027	0.
MINIMUM VALUES					
NODE	50	50	1	49	1
VALUE	-85.862	-178.55	0.	-34.471	0.
MAXIMUM VALUES					
NODE	53	46	1	51	1
VALUE	40.033	1.8117	0.	34.471	0.

Problem 2.

A rectangular plate of elastic-plastic material with Drucker-Prager criterion subjected to ramp loadings

- **Problem description and loading functions**
- **Deflection and stress plots**
- **Input file for Soild2D**
- **Sample output of Soild2D**

Problem description and loading functions

2D Straight Edge boundary on Drucker-Prager Material

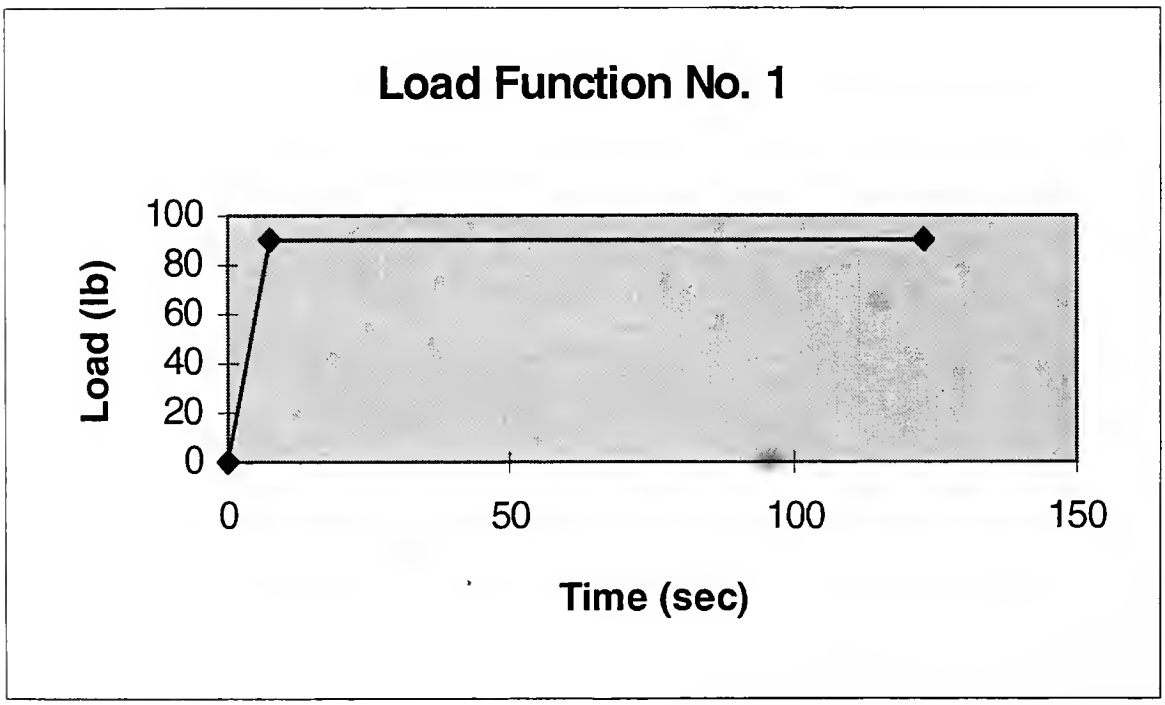
Input:

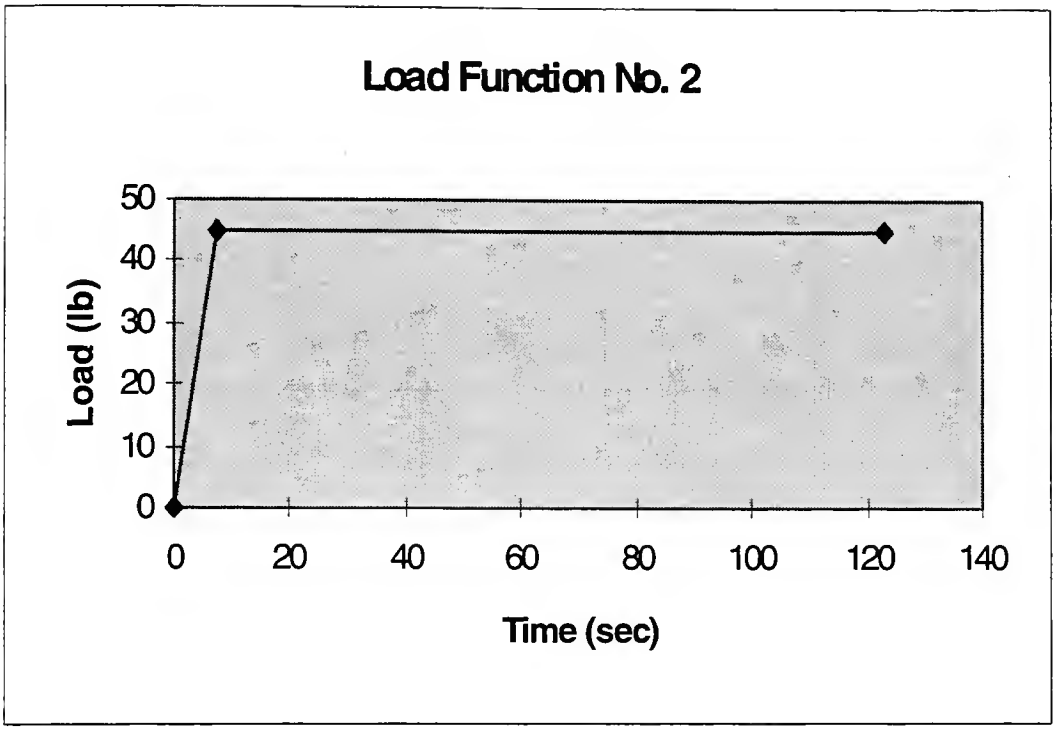
1. Geometry and finite element mesh are shown.

2. Material used in this problem is metal with the following properties:

E	=	9000 psi
υ	=	0.3
ρ	=	4.67e-02 $lb - \sec^2 / in^4$
E_t	=	500 psi
C	=	35 psi (cohesion)
ϕ	=	17 degree (internal friction angle)
β	=	0.0 (kinematics hardening rule)

3. Loading functions for S3DP are ramp loading functions.



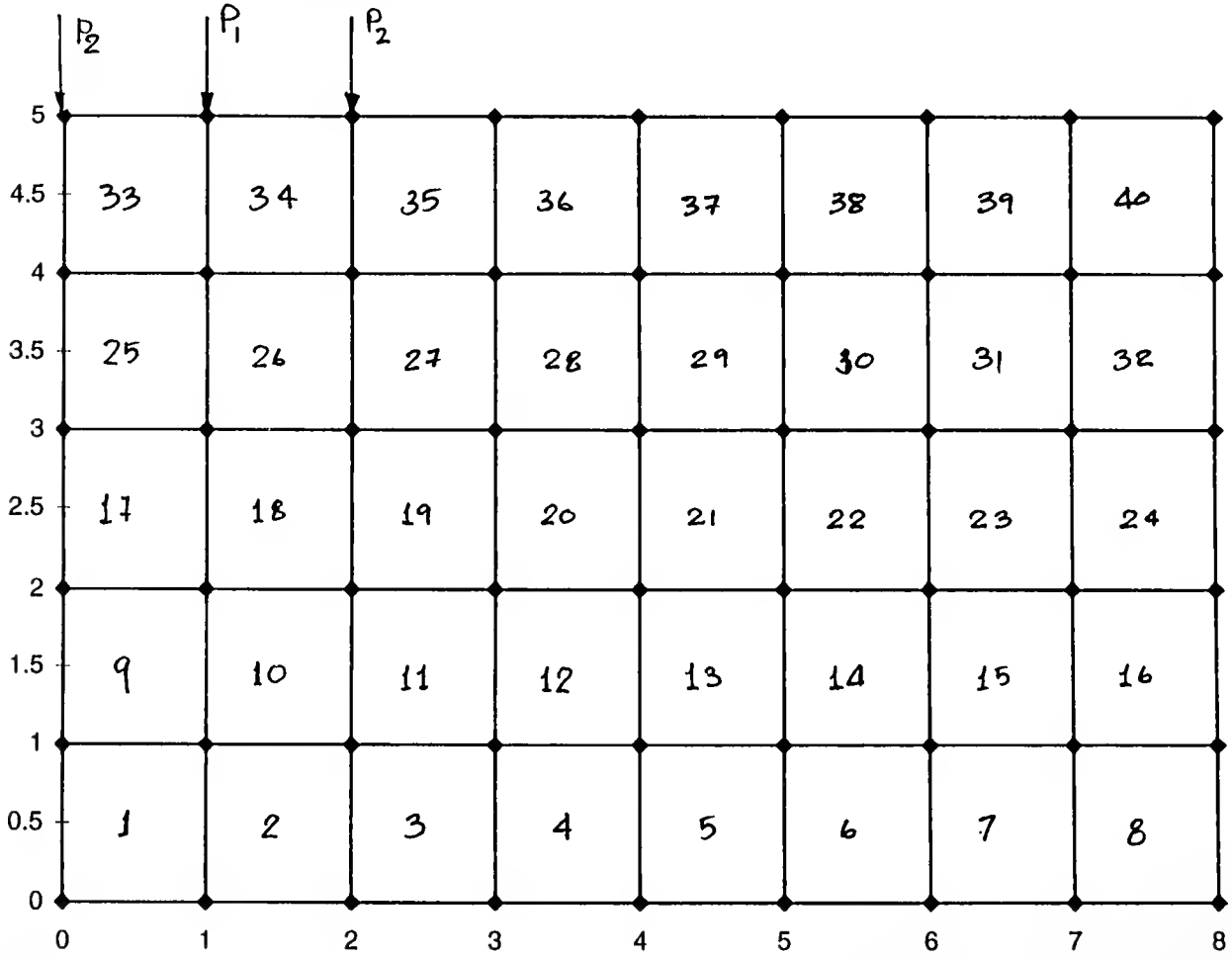


4. The examples for input data are shown after the problem results.

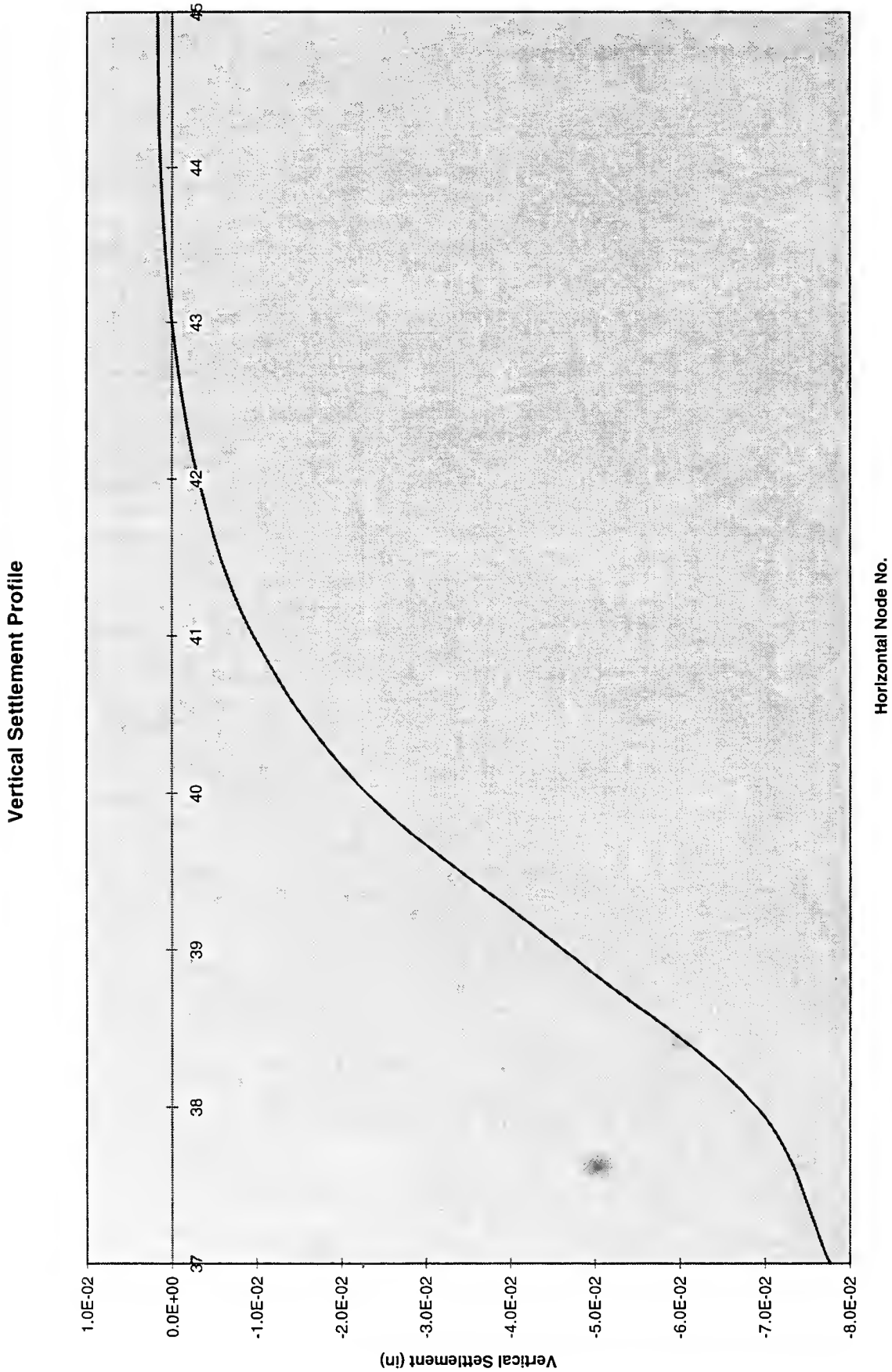
List of Problem Results:

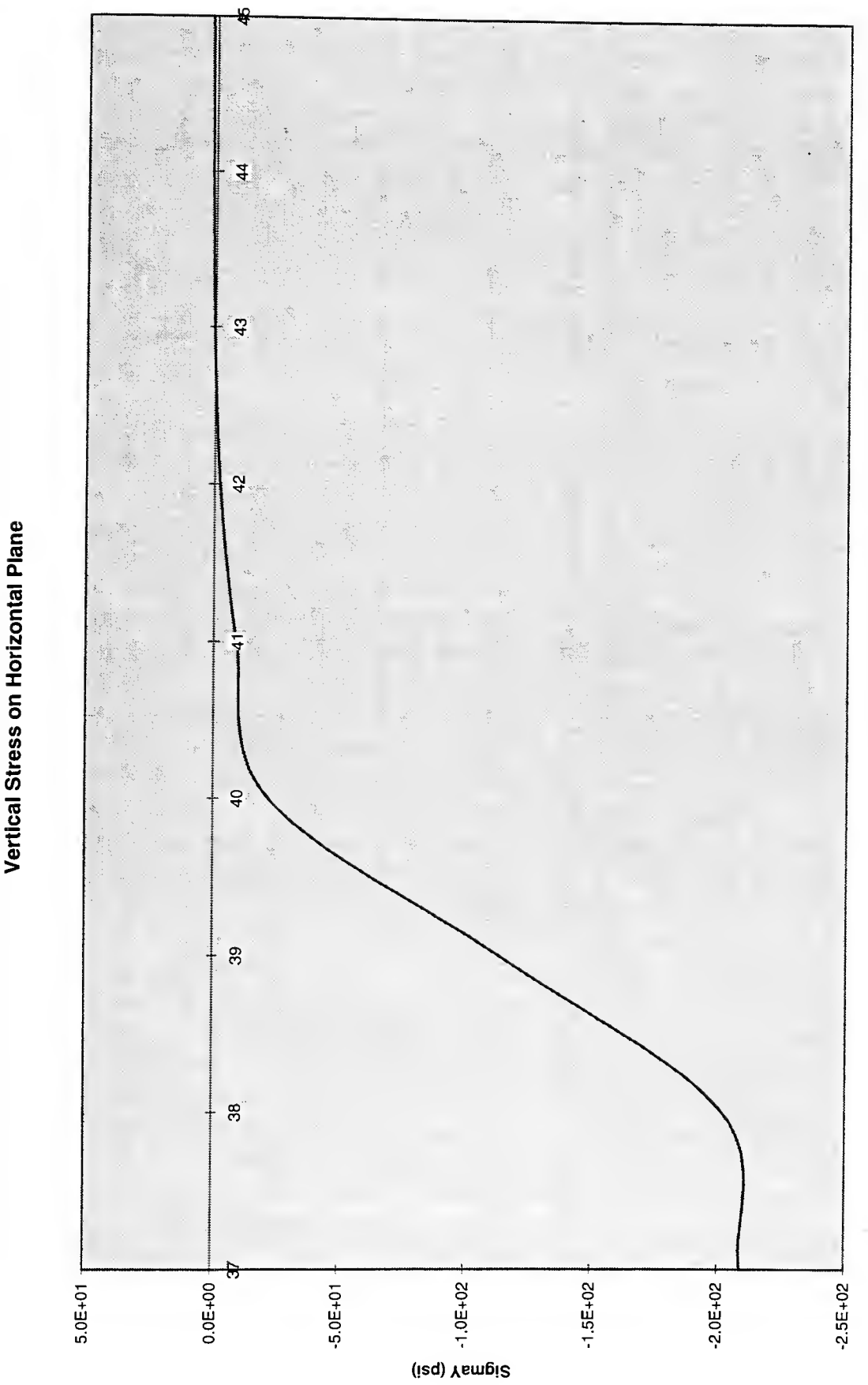
1. Vertical Settlement on the horizontal plane.
2. Plot of Stresses in Y direction versus horizontal location
3. Plot of Shear Stresses in XY plane versus horizontal location
4. Platic zone at time step: 66000, 72000, and 123000 (last step) as following:

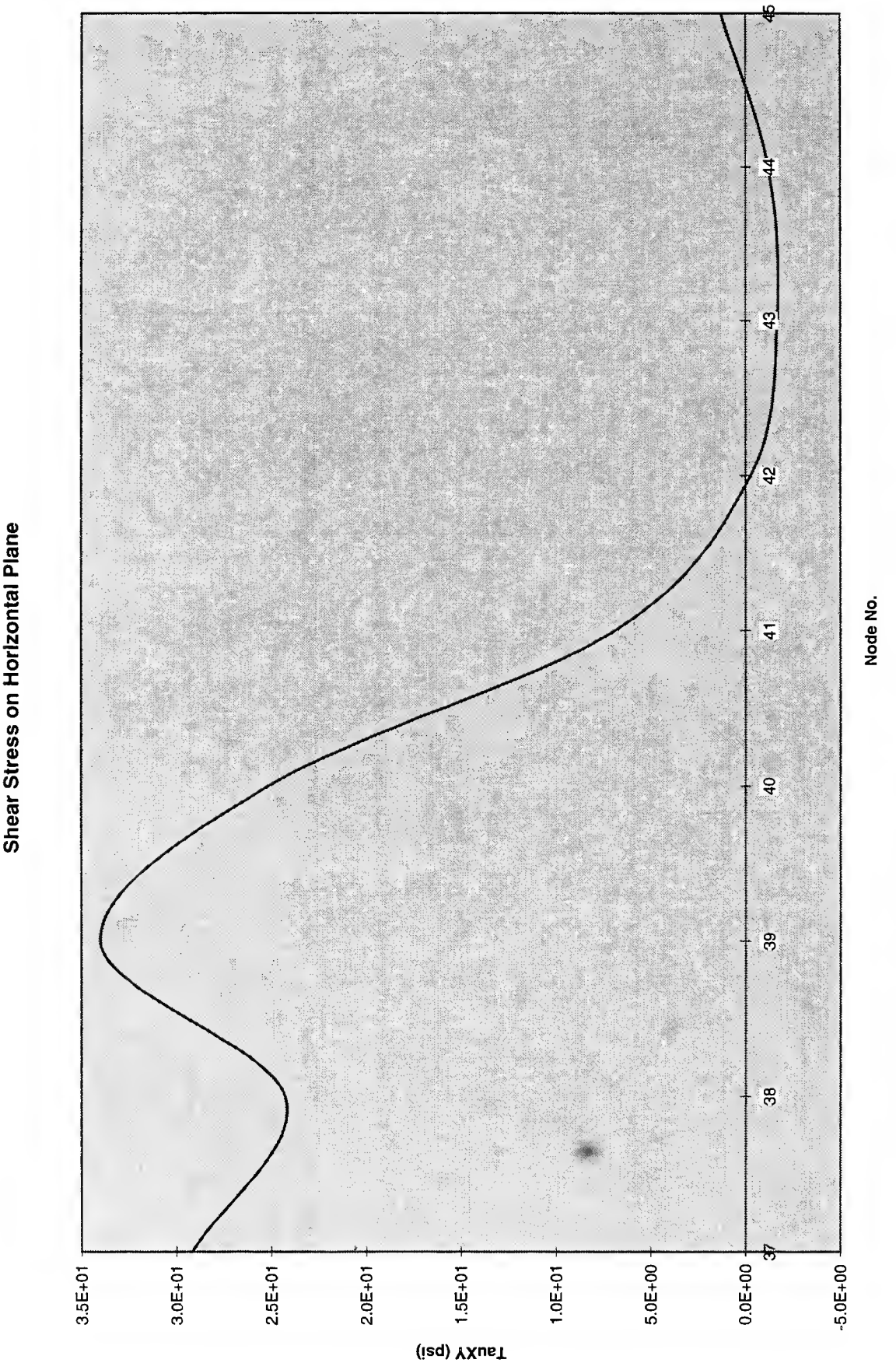
Geometry, Finite Element Mesh, and External Force

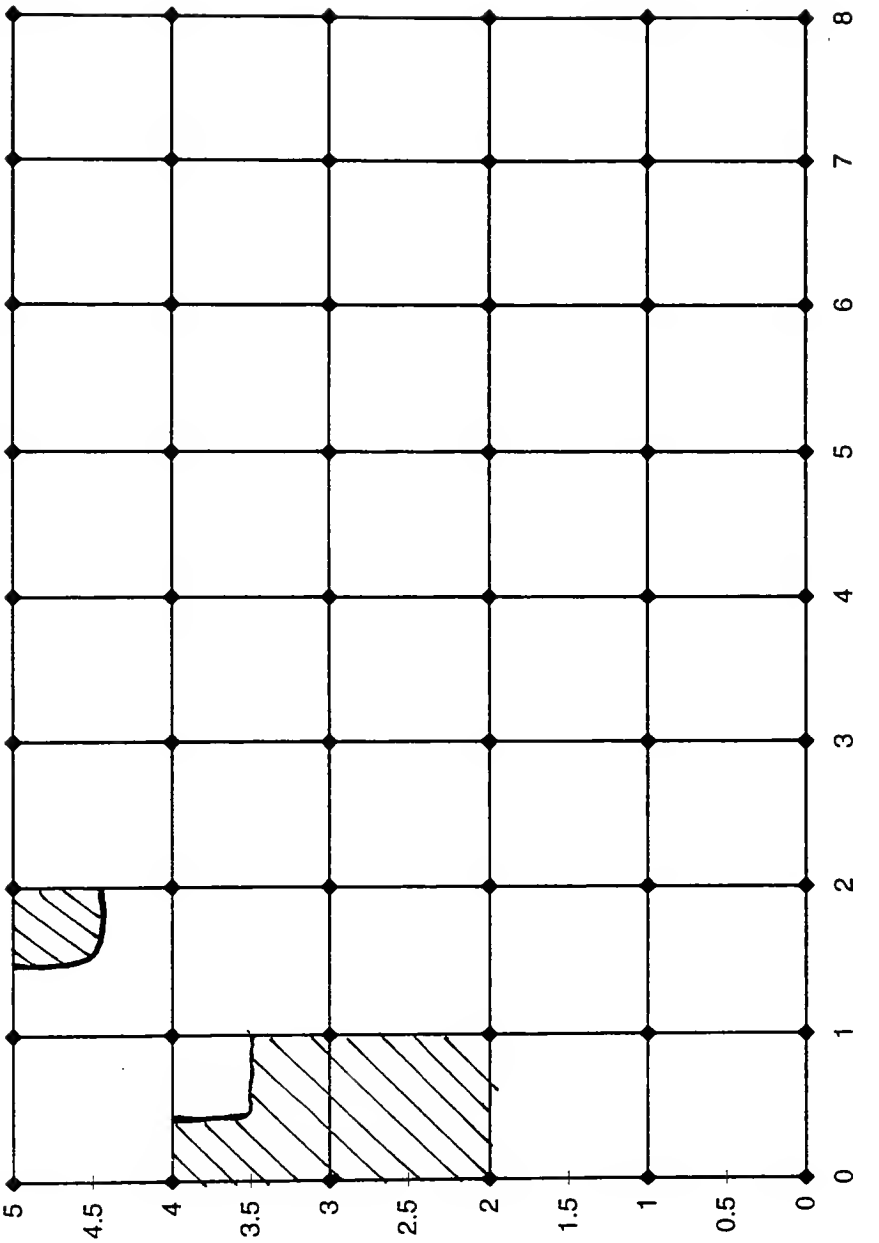


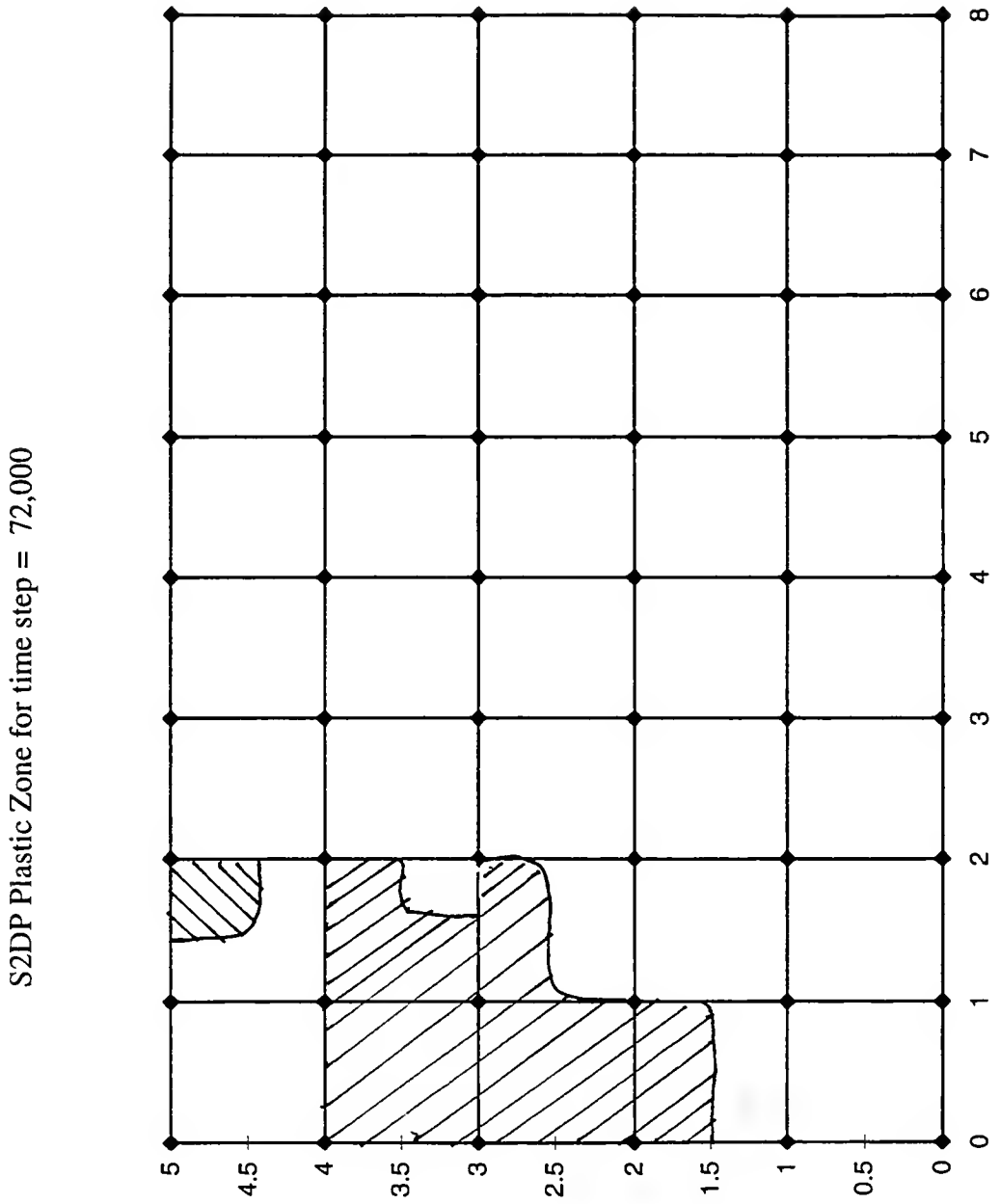
Deflection and stress plots

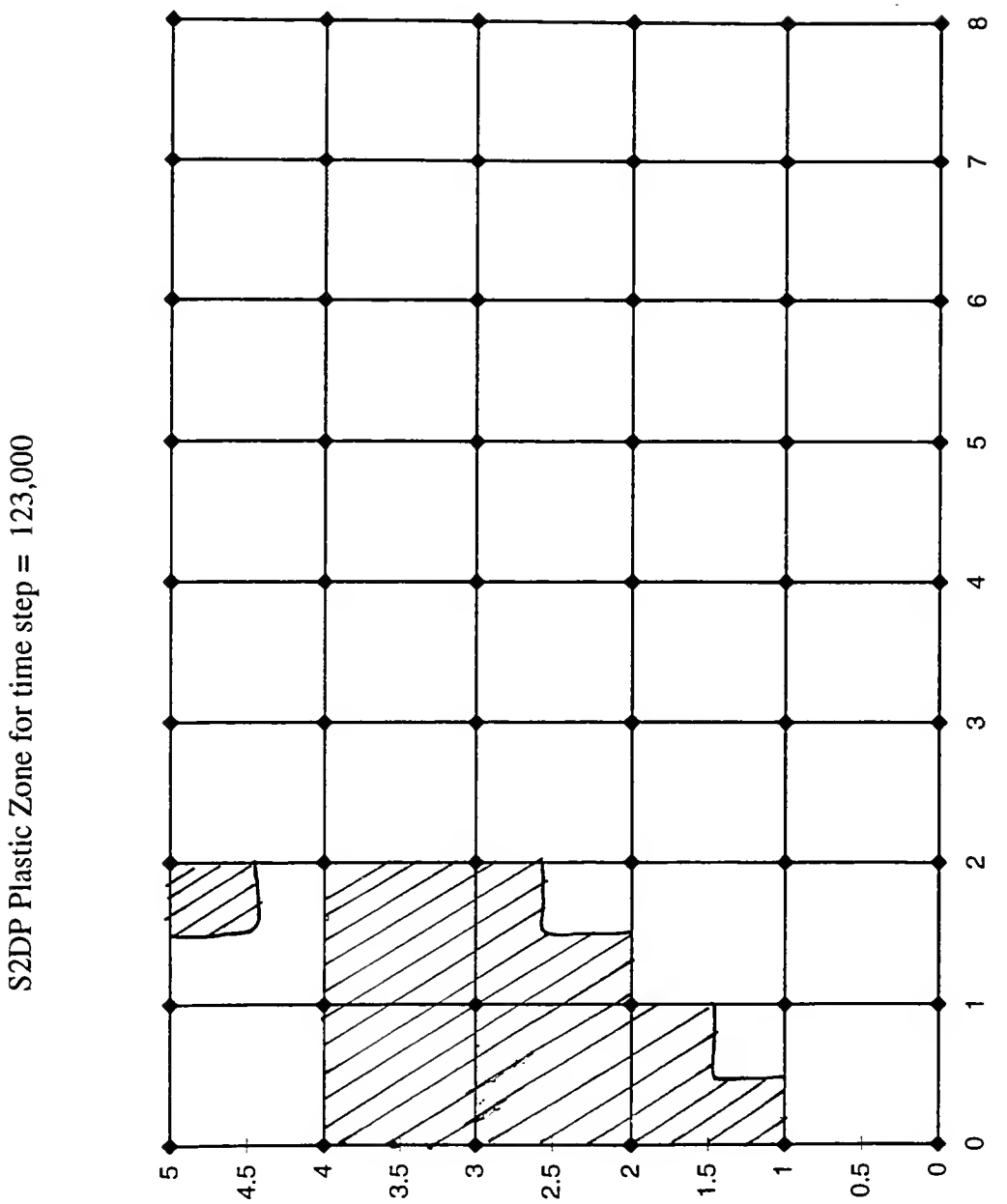

Vertical Settlement Profile
1.0E-02
0.0E+00
-1.0E-02
-2.0E-02
-3.0E-02
-4.0E-02
-5.0E-02
-6.0E-02
-7.0E-02
-8.0E-02
Vertical Settlement (in)
37
38
39
40
41
42
43
44
45
Horizontal Node No.


Vertical Stress on Horizontal Plane
5.0E+01
0.0E+00
-5.0E+01
-1.0E+02
-1.5E+02
-2.0E+02
-2.5E+02
SigmaY (psi)
37
38
39
40
41
42
43
44
45
Horizontal Node No.


Shear Stress on Horizontal Plane
TauXY (psi)
3.5E+01
3.0E+01
2.5E+01
2.0E+01
1.5E+01
1.0E+01
5.0E+00
0.0E+00
-5.0E+00
37
38
39
40
41
42
43
44
45
Node No.


S2DP Plastic Zone for time step = 66,000
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
0
1
2
3
4
5
6
7
8


S2DP Plastic Zone for time step = 72,000
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
0
1
2
3
4
5
6
7
8


S2DP Plastic Zone for time step = 123,000
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
0
1
2
3
4
5
6
7
8

Input file for Solid2D

```
2D straight edge boundary w/ ramp load on DP material
1000 54 40 1 27 2 1000000  1.e-4  1.e+4  1.e-10  0.
0 1 0 1 1
1      0.     0.          1    1
2      1.     0.          1    1
3      2.     0.          1    1
4      3.     0.          1    1
5      4.     0.          1    1
6      5.     0.          1    1
7      6.     0.          1    1
8      7.     0.          1    1
9      8.     0.          1    1
10     0.     1.          1    0
11     1.     1.          0    0
12     2.     1.          0    0
13     3.     1.          0    0
14     4.     1.          0    0
15     5.     1.          0    0
16     6.     1.          0    0
17     7.     1.          0    0
18     8.     1.          1    0
19     0.     2.          1    0
20     1.     2.          0    0
21     2.     2.          0    0
22     3.     2.          0    0
23     4.     2.          0    0
24     5.     2.          0    0
25     6.     2.          0    0
26     7.     2.          0    0
27     8.     2.          1    0
28     0.     3.          1    0
29     1.     3.          0    0
30     2.     3.          0    0
31     3.     3.          0    0
32     4.     3.          0    0
33     5.     3.          0    0
34     6.     3.          0    0
35     7.     3.          0    0
36     8.     3.          1    0
37     0.     4.          1    0
38     1.     4.          0    0
39     2.     4.          0    0
40     3.     4.          0    0
41     4.     4.          0    0
42     5.     4.          0    0
43     6.     4.          0    0
44     7.     4.          0    0
45     8.     4.          1    0
46     0.     5.          1    0
47     1.     5.          0    0
48     2.     5.          0    0
49     3.     5.          0    0
50     4.     5.          0    0
51     5.     5.          0    0
52     6.     5.          0    0
53     7.     5.          0    0
54     8.     5.          1    0
1  1  2  11  10    1  1  1  1  1
```

```
40 0 2
41 0 2
42 0 2
43 0 2
44 0 2
45 0 2

37 3 2
38 3 2
39 3 2
40 3 2
41 3 2
42 3 2
43 3 2
44 3 2
45 3 2

37 3 3
38 3 3
39 3 3
40 3 3
41 3 3
42 3 3
43 3 3
44 3 3
45 3 3
```

```
2   2   3   12   11      1   1   2   1   1
3   3   4   13   12      1   1   3   1   1
4   4   5   14   13      1   1   4   1   1
5   5   6   15   14      1   1   5   1   1
6   6   7   16   15      1   1   6   1   1
7   7   8   17   16      1   1   7   1   1
8   8   9   18   17      1   1   8   1   1
9    10   11   20   19     1   2   1   1   1
10   11   12   21   20     1   2   2   1   1
11   12   13   22   21     1   2   3   1   1
12   13   14   23   22     1   2   4   1   1
13   14   15   24   23     1   2   5   1   1
14   15   16   25   24     1   2   6   1   1
15   16   17   26   25     1   2   7   1   1
16   17   18   27   26     1   2   8   1   1
17   19   20   29   28     1   3   1   1   1
18   20   21   30   29     1   3   2   1   1
19   21   22   31   30     1   3   3   1   1
20   22   23   32   31     1   3   4   1   1
21   23   24   33   32     1   3   5   1   1
22   24   25   34   33     1   3   6   1   1
23   25   26   35   34     1   3   7   1   1
24   26   27   36   35     1   3   8   1   1
25   28   29   38   37     1   4   1   1   1
26   29   30   39   38     1   4   2   1   1
27   30   31   40   39     1   4   3   1   1
28   31   32   41   40     1   4   4   1   1
29   32   33   42   41     1   4   5   1   1
30   33   34   43   42     1   4   6   1   1
31   34   35   44   43     1   4   7   1   1
32   35   36   45   44     1   4   8   1   1
33   37   38   47   46     1   5   1   1   1
34   38   39   48   47     1   5   2   1   1
35   39   40   49   48     1   5   3   1   1
36   40   41   50   49     1   5   4   1   1
37   41   42   51   50     1   5   5   1   1
38   42   43   52   51     1   5   6   1   1
39   43   44   53   52     1   5   7   1   1
40   44   45   54   53     1   5   8   1   1
1 2 4.67e-2  9000.0  0.30  0.
35.    17.  3    500.    0.  0.4
2 3
3
0.                  0.0
7.5                 -90.0
1000.               -90.0
3
0.                  0.0
7.5                 -45.0
1000.               -45.0

47  2 1
46  2 2
48  2 2

37 0 2
38 0 2
39 0 2
```

Sample output of Solid2D

card 1 2D-straight edge boundary w/ ramp load on DP Material

---

card 2 parameter card

no of time-steps skipped between outputs = 1000
number of nodes = 54
number of elements = 40
number of materials = 1
number of output req = 27
no. of d.o.f/node = 2
no. of time steps = 1000000
time increment = .100E-03
coeff of mass damping = .100E+05
tolerance limit = .100E-09
acceleration of gravity = .00000

card 3 index card

index for accel. = 0
index for force = 1
index for I. C. = 0
index for mesh output(1) or not(0) = 1
index for plane stress(1) or strain(2) = 1

card 4 nodal point data

node no.	x-ordinate	y-ordinate	ifx	ify
1	.000	.000	1	1
2	1.000	.000	1	1
3	2.000	.000	1	1
4	3.000	.000	1	1
5	4.000	.000	1	1
6	5.000	.000	1	1
7	6.000	.000	1	1
8	7.000	.000	1	1
9	8.000	.000	1	1
10	.000	1.000	1	0
11	1.000	1.000	0	0
12	2.000	1.000	0	0
13	3.000	1.000	0	0
14	4.000	1.000	0	0
15	5.000	1.000	0	0
16	6.000	1.000	0	0
17	7.000	1.000	0	0
18	8.000	1.000	1	0
19	.000	2.000	1	0
20	1.000	2.000	0	0
21	2.000	2.000	0	0
22	3.000	2.000	0	0
23	4.000	2.000	0	0
24	5.000	2.000	0	0
25	6.000	2.000	0	0
26	7.000	2.000	0	0
27	8.000	2.000	1	0
28	.000	3.000	1	0
29	1.000	3.000	0	0
30	2.000	3.000	0	0
31	3.000	3.000	0	0
32	4.000	3.000	0	0

33	5.000	3.000	0	0
34	6.000	3.000	0	0
35	7.000	3.000	0	0
36	8.000	3.000	1	0
37	.000	4.000	1	0
38	1.000	4.000	0	0
39	2.000	4.000	0	0
40	3.000	4.000	0	0
41	4.000	4.000	0	0
42	5.000	4.000	0	0
43	6.000	4.000	0	0
44	7.000	4.000	0	0
45	8.000	4.000	1	0
46	.000	5.000	1	0
47	1.000	5.000	0	0
48	2.000	5.000	0	0
49	3.000	5.000	0	0
50	4.000	5.000	0	0
51	5.000	5.000	0	0
52	6.000	5.000	0	0
53	7.000	5.000	0	0
54	8.000	5.000	1	0

card 5 element data

ele. no.	node-1	node-2	node-3	node-4	mat-typ	row-no	col-no	ele-cond.
1	1	2	11	10	1	1	1	1
2	2	3	12	11	1	1	2	1
3	3	4	13	12	1	1	3	1
4	4	5	14	13	1	1	4	1
5	5	6	15	14	1	1	5	1
6	6	7	16	15	1	1	6	1
7	7	8	17	16	1	1	7	1
8	8	9	18	17	1	1	8	1
9	10	11	20	19	1	2	1	1
10	11	12	21	20	1	2	2	1
11	12	13	22	21	1	2	3	1
12	13	14	23	22	1	2	4	1
13	14	15	24	23	1	2	5	1
14	15	16	25	24	1	2	6	1
15	16	17	26	25	1	2	7	1
16	17	18	27	26	1	2	8	1
17	19	20	29	28	1	3	1	1
18	20	21	30	29	1	3	2	1
19	21	22	31	30	1	3	3	1
20	22	23	32	31	1	3	4	1
21	23	24	33	32	1	3	5	1
22	24	25	34	33	1	3	6	1
23	25	26	35	34	1	3	7	1
24	26	27	36	35	1	3	8	1
25	28	29	38	37	1	4	1	1
26	29	30	39	38	1	4	2	1
27	30	31	40	39	1	4	3	1
28	31	32	41	40	1	4	4	1
29	32	33	42	41	1	4	5	1
30	33	34	43	42	1	4	6	1
31	34	35	44	43	1	4	7	1

32	35	36	45	44	1	4	8	1
33	37	38	47	46	1	5	1	1
34	38	39	48	47	1	5	2	1
35	39	40	49	48	1	5	3	1
36	40	41	50	49	1	5	4	1
37	41	42	51	50	1	5	5	1
38	42	43	52	51	1	5	6	1
39	43	44	53	52	1	5	7	1
40	44	45	54	53	1	5	8	1

card 6 & 7 material property data

material group no.	material type no.	mass density	Youngs modulus	Poisson ratio	tensile strength
1	2	.4670E-01	.9000E+04	.300	.0000E+00

cohesion	phi angle	yield criterion	tangent modulus	hardening rule	thickness(b)
.3500E+02	17.00	3	.5000E+03	.000	.400

card 11 prescribed impact force

total no. of impact force history = 2

total no. of nodes applied by impact force = 3

card 12 & 13 impact force history card

force history no.	pair no.	time	iforce
1	1	.0000E+00	.0000E+00
1	2	.7500E+01	-.9000E+02
1	3	.1000E+04	-.9000E+02

card 12 & 13 impact force history card

force history no.	pair no.	time	iforce
2	1	.0000E+00	.0000E+00
2	2	.7500E+01	-.4500E+02
2	3	.1000E+04	-.4500E+02

card 14 nodal impact force information

node no.	x-(1),y(2)	force history no.
47	2	1
46	2	2
48	2	2

card 21 stress output information card

seq.	node#	d-(0),v-(1),a-(2),sig-(3)	x(1),y(2),xy(3)
1	37	0	2
2	38	0	2
3	39	0	2
4	40	0	2
5	41	0	2
6	42	0	2
7	43	0	2
8	44	0	2
9	45	0	2
10	37	3	2
11	38	3	2
12	39	3	2
13	40	3	2
14	41	3	2
15	42	3	2

```
              16          43                  3                          2
              17          44                  3                          2
              18          45                  3                          2
              19          37                  3                          3
              20          38                  3                          3
              21          39                  3                          3
              22          40                  3                          3
              23          41                  3                          3
              24          42                  3                          3
              25          43                  3                          3
              26          44                  3                          3
              27          45                  3                          3
nstep=        1000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=        2000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=        3000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=        4000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=        5000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=        6000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=        7000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=        8000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=        9000

 Plastic element no [element no.Gauss point no] =

     NONE
```

```
nstep=      10000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      11000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      12000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      13000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      14000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      15000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      16000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      17000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      18000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      19000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      20000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      21000
```

```
 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      22000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      23000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      24000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      25000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      26000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      27000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      28000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      29000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      30000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      31000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      32000

 Plastic element no [element no.Gauss point no] =
```

```
     NONE
nstep=      33000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      34000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      35000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      36000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      37000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      38000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      39000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      40000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      41000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      42000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      43000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      44000
```

```
 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      45000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      46000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      47000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      48000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      49000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      50000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      51000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      52000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      53000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      54000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      55000

 Plastic element no [element no.Gauss point no] =
```

```
     NONE
nstep=      56000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      57000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      58000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      59000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      60000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=      61000

 Plastic element no [element no.Gauss point no] =
   25.1    35.3
nstep=      62000

 Plastic element no [element no.Gauss point no] =
   17.4    25.1    35.3
nstep=      63000

 Plastic element no [element no.Gauss point no] =
   17.3    17.4    25.1    25.2    35.3
nstep=      64000

 Plastic element no [element no.Gauss point no] =
   17.3    17.4    25.1    25.2    35.3
nstep=      65000

 Plastic element no [element no.Gauss point no] =
   17.1    17.3    17.4    25.1    25.2    26.4    35.3
nstep=      66000

 Plastic element no [element no.Gauss point no] =
   17.1    17.2    17.3    17.4    25.1    25.2    26.4    35.3
nstep=      67000

 Plastic element no [element no.Gauss point no] =
   17.1    17.2    17.3    17.4    25.1    25.2    26.4    35.3
nstep=      68000
```

```
 Plastic element no [element no.Gauss point no] =
   17.1    17.2    17.3    17.4    25.1    25.2    25.4    26.3
   26.4    35.3
nstep=      69000

 Plastic element no [element no.Gauss point no] =
   17.1    17.2    17.3    17.4    25.1    25.2    25.4    26.3
   26.4    35.3
nstep=      70000

 Plastic element no [element no.Gauss point no] =
   17.1    17.2    17.3    17.4    25.1    25.2    25.3    25.4
   26.3    26.4    35.3
nstep=      71000

 Plastic element no [element no.Gauss point no] =
   17.1    17.2    17.3    17.4    18.4    25.1    25.2    25.3
   25.4    26.3    26.4    35.3
nstep=      72000

 Plastic element no [element no.Gauss point no] =
    9.3     9.4    17.1    17.2    17.3    17.4    18.4    25.1
   25.2    25.3    25.4    26.1    26.3    26.4    35.3
nstep=      73000

 Plastic element no [element no.Gauss point no] =
    9.3     9.4    17.1    17.2    17.3    17.4    18.3    18.4
   25.1    25.2    25.3    25.4    26.1    26.3    26.4    35.3
nstep=      74000

 Plastic element no [element no.Gauss point no] =
    9.3     9.4    17.1    17.2    17.3    17.4    18.3    18.4
   25.1    25.2    25.3    25.4    26.1    26.3    26.4    35.3
nstep=      75000

 Plastic element no [element no.Gauss point no] =
    9.3     9.4    17.1    17.2    17.3    17.4    18.3    18.4
   25.1    25.2    25.3    25.4    26.1    26.3    26.4    35.3
nstep=      76000

 Plastic element no [element no.Gauss point no] =
    9.3     9.4    17.1    17.2    17.3    17.4    18.3    18.4
   25.1    25.2    25.3    25.4    26.1    26.3    26.4    35.3
nstep=      77000

 Plastic element no [element no.Gauss point no] =
    9.3     9.4    17.1    17.2    17.3    17.4    18.3    18.4
   25.1    25.2    25.3    25.4    26.1    26.3    26.4    35.3
nstep=      78000

 Plastic element no [element no.Gauss point no] =
    9.3     9.4    17.1    17.2    17.3    17.4    18.1    18.3
   18.4    25.1    25.2    25.3    25.4    26.1    26.3    26.4
   35.3
nstep=      79000

 Plastic element no [element no.Gauss point no] =
```

```
    9.3     9.4    17.1    17.2    17.3    17.4    18.1    18.3
   18.4    25.1    25.2    25.3    25.4    26.1    26.2    26.3
   26.4    35.3
nstep=      80000

 Plastic element no [element no.Gauss point no] =
    9.3     9.4    17.1    17.2    17.3    17.4    18.1    18.3
   18.4    25.1    25.2    25.3    25.4    26.1    26.2    26.3
   26.4    35.3
nstep=      81000

 Plastic element no [element no.Gauss point no] =
    9.3     9.4    17.1    17.2    17.3    17.4    18.1    18.3
   18.4    25.1    25.2    25.3    25.4    26.1    26.2    26.3
   26.4    35.3
nstep=      82000

 Plastic element no [element no.Gauss point no] =
    9.3     9.4    17.1    17.2    17.3    17.4    18.1    18.3
   18.4    25.1    25.2    25.3    25.4    26.1    26.2    26.3
   26.4    35.3
nstep=      83000

 Plastic element no [element no.Gauss point no] =
    9.3     9.4    17.1    17.2    17.3    17.4    18.1    18.3
   18.4    25.1    25.2    25.3    25.4    26.1    26.2    26.3
   26.4    35.3
nstep=      84000

 Plastic element no [element no.Gauss point no] =
    9.3     9.4    17.1    17.2    17.3    17.4    18.1    18.3
   18.4    25.1    25.2    25.3    25.4    26.1    26.2    26.3
   26.4    35.3
nstep=      85000

 Plastic element no [element no.Gauss point no] =
    9.3     9.4    17.1    17.2    17.3    17.4    18.1    18.3
   18.4    25.1    25.2    25.3    25.4    26.1    26.2    26.3
   26.4    35.3
nstep=      86000

 Plastic element no [element no.Gauss point no] =
    9.3     9.4    17.1    17.2    17.3    17.4    18.1    18.3
   18.4    25.1    25.2    25.3    25.4    26.1    26.2    26.3
   26.4    35.3
nstep=      87000

 Plastic element no [element no.Gauss point no] =
    9.3     9.4    17.1    17.2    17.3    17.4    18.1    18.3
   18.4    25.1    25.2    25.3    25.4    26.1    26.2    26.3
   26.4    35.3
nstep=      88000

 Plastic element no [element no.Gauss point no] =
    9.3     9.4    17.1    17.2    17.3    17.4    18.1    18.3
   18.4    25.1    25.2    25.3    25.4    26.1    26.2    26.3
   26.4    35.3
```

```
nstep=      89000

 Plastic element no [element no.Gauss point no] =
    9.3     9.4    17.1    17.2    17.3    17.4    18.1    18.3
   18.4    25.1    25.2    25.3    25.4    26.1    26.2    26.3
   26.4    35.3
nstep=      90000

 Plastic element no [element no.Gauss point no] =
    9.3     9.4    17.1    17.2    17.3    17.4    18.1    18.3
   18.4    25.1    25.2    25.3    25.4    26.1    26.2    26.3
   26.4    35.3
nstep=      91000

 Plastic element no [element no.Gauss point no] =
    9.3     9.4    17.1    17.2    17.3    17.4    18.1    18.3
   18.4    25.1    25.2    25.3    25.4    26.1    26.2    26.3
   26.4    35.3
nstep=      92000

 Plastic element no [element no.Gauss point no] =
    9.3     9.4    17.1    17.2    17.3    17.4    18.1    18.3
   18.4    25.1    25.2    25.3    25.4    26.1    26.2    26.3
   26.4    35.3
nstep=      93000

 Plastic element no [element no.Gauss point no] =
    9.3     9.4    17.1    17.2    17.3    17.4    18.1    18.3
   18.4    25.1    25.2    25.3    25.4    26.1    26.2    26.3
   26.4    35.3
nstep=      94000

 Plastic element no [element no.Gauss point no] =
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
nstep=      95000

 Plastic element no [element no.Gauss point no] =
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
nstep=      96000

 Plastic element no [element no.Gauss point no] =
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
nstep=      97000

 Plastic element no [element no.Gauss point no] =
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
nstep=      98000

 Plastic element no [element no.Gauss point no] =
```

```
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
nstep=      99000

 Plastic element no [element no.Gauss point no] =
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
nstep=     100000

 Plastic element no [element no.Gauss point no] =
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
nstep=     101000

 Plastic element no [element no.Gauss point no] =
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
nstep=     102000

 Plastic element no [element no.Gauss point no] =
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
nstep=     103000

 Plastic element no [element no.Gauss point no] =
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
nstep=     104000

 Plastic element no [element no.Gauss point no] =
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
nstep=     105000

 Plastic element no [element no.Gauss point no] =
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
nstep=     106000

 Plastic element no [element no.Gauss point no] =
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
nstep=     107000

 Plastic element no [element no.Gauss point no] =
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
```

```
nstep=     108000

 Plastic element no [element no.Gauss point no] =
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
nstep=     109000

 Plastic element no [element no.Gauss point no] =
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
nstep=     110000

 Plastic element no [element no.Gauss point no] =
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
nstep=     111000

 Plastic element no [element no.Gauss point no] =
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
nstep=     112000

 Plastic element no [element no.Gauss point no] =
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
nstep=     113000

 Plastic element no [element no.Gauss point no] =
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
nstep=     114000

 Plastic element no [element no.Gauss point no] =
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
nstep=     115000

 Plastic element no [element no.Gauss point no] =
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
nstep=     116000

 Plastic element no [element no.Gauss point no] =
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
nstep=     117000

 Plastic element no [element no.Gauss point no] =
```

```
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
nstep=     118000

 Plastic element no [element no.Gauss point no] =
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
nstep=     119000

 Plastic element no [element no.Gauss point no] =
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
nstep=     120000

 Plastic element no [element no.Gauss point no] =
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
nstep=     121000

 Plastic element no [element no.Gauss point no] =
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
nstep=     122000

 Plastic element no [element no.Gauss point no] =
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
nstep=     123000

 Plastic element no [element no.Gauss point no] =
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
nstep=     123716

 Plastic element no =>[Element no.Gauss point no] =
    9.1     9.3     9.4    17.1    17.2    17.3    17.4    18.1
   18.3    18.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    35.3
```

card 21 stress output information card

seq.	node#	d-(0),v-(1),a-(2),sig-(3)	x(1),y(2),xy(3)
1	37	0	2
2	38	0	2
3	39	0	2
4	40	0	2
5	41	0	2
6	42	0	2
7	43	0	2
8	44	0	2
9	45	0	2
10	37	3	2
11	38	3	2
12	39	3	2
13	40	3	2
14	41	3	2
15	42	3	2
16	43	3	2
17	44	3	2
18	45	3	2
19	37	3	3
20	38	3	3
21	39	3	3
22	40	3	3
23	41	3	3
24	42	3	3
25	43	3	3
26	44	3	3
27	45	3	3

time =	.10000E+00	-.114E-03	-.101E-03	-.572E-04	-.132E-04	-.141E-06	.339E-07
		.268E-07	.315E-08	.105E-08	-.129E+01	-.129E+01	-.656E+00
		-.164E-01	-.116E-01	-.130E-02	-.308E-03	-.787E-04	-.386E-04
		.447E-01	.767E-01	.118E+00	.763E-01	.170E-01	-.453E-03
		-.127E-03	-.466E-04	-.727E-05			
time =	.20000E+00	-.447E-03	-.394E-03	-.228E-03	-.614E-04	-.436E-05	.440E-06
		.481E-06	.153E-06	.757E-07	-.331E+01	-.329E+01	-.168E+01
		-.781E-01	-.316E-01	-.265E-02	-.997E-03	-.641E-03	-.554E-03
		.181E+00	.258E+00	.391E+00	.256E+00	.599E-01	-.249E-02
		-.255E-02	-.982E-03	-.268E-03			
time =	.30000E+00	-.928E-03	-.818E-03	-.484E-03	-.147E-03	-.182E-04	.472E-06
		.197E-05	.101E-05	.650E-06	-.555E+01	-.548E+01	-.283E+01
		-.176E+00	-.538E-01	-.460E-03	.783E-04	-.105E-02	-.141E-02
		.380E+00	.485E+00	.730E+00	.482E+00	.118E+00	-.670E-02
		-.984E-02	-.453E-02	-.123E-02			
time =	.40000E+00	-.152E-02	-.134E-02	-.807E-03	-.268E-03	-.448E-04	-.151E-05
		.458E-05	.324E-05	.248E-05	-.792E+01	-.779E+01	-.405E+01
		-.306E+00	-.834E-01	.318E-02	.344E-02	-.215E-03	-.154E-02
		.620E+00	.738E+00	.111E+01	.736E+00	.187E+00	-.123E-01
		-.222E-01	-.115E-01	-.265E-02			
time =	.50000E+00	-.219E-02	-.193E-02	-.118E-02	-.420E-03	-.851E-04	-.679E-05
		.805E-05	.734E-05	.625E-05	-.104E+02	-.102E+02	-.532E+01
		-.466E+00	-.124E+00	.567E-02	.857E-02	.252E-02	.401E-04
		.887E+00	.101E+01	.150E+01	.101E+01	.264E+00	-.185E-01
		-.387E-01	-.216E-01	-.378E-02			
time =	.60000E+00	-.293E-02	-.259E-02	-.161E-02	-.600E-03	-.138E-03	-.161E-04
		.120E-04	.135E-04	.124E-04	-.129E+02	-.126E+02	-.664E+01
		-.652E+00	-.176E+00	.548E-02	.148E-01	.743E-02	.391E-02

```
                    .117E+01  .129E+01  .192E+01  .129E+01  .346E+00 -.246E-01
                   -.579E-01 -.340E-01 -.381E-02
time =  .70000E+00 -.371E-02 -.329E-02 -.206E-02 -.803E-03 -.204E-03 -.296E-04
                    .160E-04  .216E-04  .210E-04 -.155E+02 -.151E+02 -.799E+01
                   -.861E+00 -.238E+00  .191E-02  .217E-01  .145E-01  .103E-01
                    .147E+01  .157E+01  .234E+01  .158E+01  .434E+00 -.300E-01
                   -.788E-01 -.480E-01 -.223E-02
time =  .80000E+00 -.453E-02 -.402E-02 -.255E-02 -.103E-02 -.280E-03 -.472E-04
                    .200E-04  .315E-04  .319E-04 -.181E+02 -.176E+02 -.937E+01
                   -.109E+01 -.311E+00 -.520E-02  .289E-01  .235E-01  .191E-01
                    .178E+01  .187E+01  .277E+01  .188E+01  .525E+00 -.347E-01
                   -.100E+00 -.629E-01  .123E-02
time =  .90000E+00 -.539E-02 -.478E-02 -.306E-02 -.126E-02 -.365E-03 -.686E-04
                    .237E-04  .430E-04  .449E-04 -.207E+02 -.202E+02 -.108E+02
                   -.133E+01 -.393E+00 -.157E-01  .360E-01  .343E-01  .301E-01
                    .210E+01  .216E+01  .320E+01  .218E+01  .618E+00 -.385E-01
                   -.123E+00 -.784E-01  .662E-02
time =  .10000E+01 -.626E-02 -.557E-02 -.358E-02 -.152E-02 -.459E-03 -.935E-04
                    .269E-04  .558E-04  .598E-04 -.234E+02 -.228E+02 -.122E+02
                   -.159E+01 -.482E+00 -.294E-01  .429E-01  .465E-01  .431E-01
                    .242E+01  .246E+01  .364E+01  .249E+01  .714E+00 -.415E-01
                   -.145E+00 -.941E-01  .138E-01
time =  .11000E+01 -.716E-02 -.637E-02 -.413E-02 -.178E-02 -.558E-03 -.121E-03
                    .297E-04  .696E-04  .762E-04 -.261E+02 -.254E+02 -.136E+02
                   -.185E+01 -.578E+00 -.460E-01  .496E-01  .599E-01  .577E-01
                    .275E+01  .276E+01  .408E+01  .280E+01  .811E+00 -.437E-01
                   -.167E+00 -.110E+00  .227E-01
time =  .12000E+01 -.807E-02 -.719E-02 -.468E-02 -.205E-02 -.664E-03 -.152E-03
                    .320E-04  .843E-04  .938E-04 -.288E+02 -.280E+02 -.151E+02
                   -.213E+01 -.679E+00 -.650E-01  .559E-01  .742E-01  .736E-01
                    .308E+01  .306E+01  .452E+01  .310E+01  .909E+00 -.452E-01
                   -.188E+00 -.126E+00  .331E-01
time =  .13000E+01 -.900E-02 -.802E-02 -.525E-02 -.233E-02 -.774E-03 -.185E-03
                    .339E-04  .995E-04  .112E-03 -.315E+02 -.306E+02 -.165E+02
                   -.241E+01 -.784E+00 -.861E-01  .619E-01  .892E-01  .907E-01
                    .341E+01  .336E+01  .497E+01  .341E+01  .101E+01 -.462E-01
                   -.210E+00 -.141E+00  .447E-01
time =  .14000E+01 -.993E-02 -.886E-02 -.582E-02 -.261E-02 -.888E-03 -.220E-03
                    .353E-04  .115E-03  .132E-03 -.343E+02 -.332E+02 -.180E+02
                   -.270E+01 -.893E+00 -.109E+00  .675E-01  .105E+00  .109E+00
                    .374E+01  .366E+01  .541E+01  .372E+01  .111E+01 -.467E-01
                   -.231E+00 -.157E+00  .574E-01
time =  .15000E+01 -.109E-01 -.970E-02 -.640E-02 -.290E-02 -.100E-02 -.256E-03
                    .363E-04  .131E-03  .152E-03 -.370E+02 -.359E+02 -.195E+02
                   -.299E+01 -.101E+01 -.134E+00  .728E-01  .121E+00  .127E+00
                    .408E+01  .397E+01  .586E+01  .404E+01  .121E+01 -.469E-01
                   -.252E+00 -.173E+00  .709E-01
time =  .16000E+01 -.118E-01 -.106E-01 -.698E-02 -.319E-02 -.112E-02 -.294E-03
                    .370E-04  .148E-03  .172E-03 -.397E+02 -.385E+02 -.210E+02
                   -.328E+01 -.112E+01 -.159E+00  .777E-01  .137E+00  .146E+00
                    .442E+01  .427E+01  .630E+01  .435E+01  .131E+01 -.468E-01
                   -.273E+00 -.188E+00  .853E-01
time =  .17000E+01 -.128E-01 -.114E-01 -.757E-02 -.349E-02 -.125E-02 -.332E-03
                    .373E-04  .164E-03  .193E-03 -.425E+02 -.412E+02 -.224E+02
                   -.358E+01 -.124E+01 -.186E+00  .824E-01  .154E+00  .166E+00
                    .475E+01  .458E+01  .675E+01  .466E+01  .141E+01 -.465E-01
                   -.293E+00 -.203E+00  .100E+00
time =  .18000E+01 -.137E-01 -.123E-01 -.816E-02 -.379E-02 -.137E-02 -.372E-03
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                    .373E-04  .181E-03  .214E-03 -.453E+02 -.438E+02 -.239E+02
                   -.388E+01 -.135E+01 -.214E+00  .868E-01  .170E+00  .185E+00
                    .509E+01  .489E+01  .720E+01  .497E+01  .151E+01 -.461E-01
                   -.314E+00 -.219E+00  .116E+00
time =  .19000E+01 -.147E-01 -.131E-01 -.875E-02 -.409E-02 -.149E-02 -.413E-03
                    .371E-04  .198E-03  .236E-03 -.480E+02 -.465E+02 -.254E+02
                   -.419E+01 -.147E+01 -.242E+00  .911E-01  .187E+00  .205E+00
                    .543E+01  .519E+01  .765E+01  .528E+01  .161E+01 -.456E-01
                   -.334E+00 -.234E+00  .131E+00
time =  .20000E+01 -.157E-01 -.140E-01 -.935E-02 -.439E-02 -.162E-02 -.454E-03
                    .366E-04  .214E-03  .257E-03 -.508E+02 -.491E+02 -.269E+02
                   -.449E+01 -.159E+01 -.271E+00  .951E-01  .204E+00  .225E+00
                    .578E+01  .550E+01  .809E+01  .559E+01  .171E+01 -.450E-01
                   -.355E+00 -.249E+00  .147E+00
time =  .21000E+01 -.166E-01 -.149E-01 -.994E-02 -.470E-02 -.175E-02 -.495E-03
                    .360E-04  .231E-03  .278E-03 -.535E+02 -.518E+02 -.284E+02
                   -.480E+01 -.171E+01 -.301E+00  .990E-01  .221E+00  .246E+00
                    .612E+01  .581E+01  .854E+01  .590E+01  .181E+01 -.445E-01
                   -.375E+00 -.264E+00  .164E+00
time =  .22000E+01 -.176E-01 -.157E-01 -.105E-01 -.500E-02 -.187E-02 -.537E-03
                    .352E-04  .248E-03  .300E-03 -.563E+02 -.545E+02 -.299E+02
                   -.510E+01 -.184E+01 -.330E+00  .103E+00  .238E+00  .266E+00
                    .646E+01  .612E+01  .899E+01  .621E+01  .191E+01 -.440E-01
                   -.396E+00 -.280E+00  .180E+00
time =  .23000E+01 -.186E-01 -.166E-01 -.111E-01 -.531E-02 -.200E-02 -.580E-03
                    .343E-04  .265E-03  .322E-03 -.591E+02 -.571E+02 -.314E+02
                   -.541E+01 -.196E+01 -.361E+00  .106E+00  .255E+00  .287E+00
                    .680E+01  .643E+01  .944E+01  .652E+01  .201E+01 -.435E-01
                   -.416E+00 -.295E+00  .197E+00
time =  .24000E+01 -.195E-01 -.175E-01 -.117E-01 -.561E-02 -.213E-02 -.622E-03
                    .333E-04  .282E-03  .344E-03 -.618E+02 -.598E+02 -.329E+02
                   -.571E+01 -.208E+01 -.391E+00  .110E+00  .272E+00  .307E+00
                    .715E+01  .674E+01  .989E+01  .683E+01  .211E+01 -.431E-01
                   -.436E+00 -.310E+00  .214E+00
time =  .25000E+01 -.205E-01 -.184E-01 -.123E-01 -.592E-02 -.226E-02 -.665E-03
                    .323E-04  .299E-03  .365E-03 -.646E+02 -.625E+02 -.344E+02
                   -.602E+01 -.220E+01 -.422E+00  .113E+00  .289E+00  .328E+00
                    .749E+01  .705E+01  .103E+02  .714E+01  .221E+01 -.428E-01
                   -.457E+00 -.325E+00  .231E+00
time =  .26000E+01 -.215E-01 -.192E-01 -.129E-01 -.623E-02 -.239E-02 -.708E-03
                    .311E-04  .315E-03  .387E-03 -.674E+02 -.651E+02 -.358E+02
                   -.633E+01 -.233E+01 -.452E+00  .117E+00  .306E+00  .348E+00
                    .784E+01  .736E+01  .108E+02  .745E+01  .231E+01 -.425E-01
                   -.478E+00 -.341E+00  .248E+00
time =  .27000E+01 -.225E-01 -.201E-01 -.135E-01 -.653E-02 -.252E-02 -.752E-03
                    .299E-04  .332E-03  .409E-03 -.702E+02 -.678E+02 -.373E+02
                   -.664E+01 -.245E+01 -.483E+00  .120E+00  .323E+00  .369E+00
                    .818E+01  .767E+01  .112E+02  .776E+01  .241E+01 -.424E-01
                   -.498E+00 -.356E+00  .265E+00
time =  .28000E+01 -.234E-01 -.210E-01 -.142E-01 -.684E-02 -.265E-02 -.795E-03
                    .287E-04  .349E-03  .431E-03 -.729E+02 -.705E+02 -.388E+02
                   -.694E+01 -.257E+01 -.514E+00  .124E+00  .340E+00  .390E+00
                    .853E+01  .798E+01  .117E+02  .807E+01  .251E+01 -.424E-01
                   -.519E+00 -.371E+00  .282E+00
time =  .29000E+01 -.244E-01 -.219E-01 -.148E-01 -.715E-02 -.278E-02 -.838E-03
                    .274E-04  .366E-03  .453E-03 -.757E+02 -.732E+02 -.403E+02
                   -.725E+01 -.270E+01 -.545E+00  .127E+00  .357E+00  .410E+00
                    .888E+01  .830E+01  .121E+02  .838E+01  .261E+01 -.425E-01
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                    -.539E+00 -.387E+00  .300E+00
time =  .30000E+01 -.254E-01 -.228E-01 -.154E-01 -.746E-02 -.291E-02 -.882E-03
                     .262E-04  .383E-03  .474E-03 -.785E+02 -.758E+02 -.418E+02
                    -.756E+01 -.282E+01 -.576E+00  .130E+00  .374E+00  .431E+00
                     .922E+01  .861E+01  .126E+02  .869E+01  .271E+01 -.427E-01
                    -.560E+00 -.402E+00  .317E+00
time =  .31000E+01 -.264E-01 -.236E-01 -.160E-01 -.777E-02 -.304E-02 -.925E-03
                     .249E-04  .400E-03  .496E-03 -.813E+02 -.785E+02 -.433E+02
                    -.787E+01 -.294E+01 -.607E+00  .134E+00  .391E+00  .452E+00
                     .957E+01  .892E+01  .130E+02  .900E+01  .280E+01 -.431E-01
                    -.581E+00 -.417E+00  .334E+00
time =  .32000E+01 -.274E-01 -.245E-01 -.166E-01 -.808E-02 -.317E-02 -.968E-03
                     .236E-04  .417E-03  .518E-03 -.840E+02 -.812E+02 -.448E+02
                    -.817E+01 -.307E+01 -.638E+00  .137E+00  .408E+00  .473E+00
                     .992E+01  .924E+01  .135E+02  .930E+01  .290E+01 -.435E-01
                    -.602E+00 -.433E+00  .351E+00
time =  .33000E+01 -.283E-01 -.254E-01 -.172E-01 -.838E-02 -.330E-02 -.101E-02
                     .224E-04  .434E-03  .540E-03 -.868E+02 -.839E+02 -.463E+02
                    -.848E+01 -.319E+01 -.669E+00  .140E+00  .426E+00  .494E+00
                     .103E+02  .955E+01  .139E+02  .961E+01  .300E+01 -.441E-01
                    -.623E+00 -.448E+00  .369E+00
time =  .34000E+01 -.293E-01 -.263E-01 -.178E-01 -.869E-02 -.343E-02 -.106E-02
                     .211E-04  .451E-03  .562E-03 -.896E+02 -.865E+02 -.478E+02
                    -.879E+01 -.331E+01 -.700E+00  .144E+00  .443E+00  .514E+00
                     .106E+02  .987E+01  .144E+02  .992E+01  .310E+01 -.449E-01
                    -.644E+00 -.464E+00  .386E+00
time =  .35000E+01 -.303E-01 -.271E-01 -.184E-01 -.900E-02 -.356E-02 -.110E-02
                     .199E-04  .468E-03  .584E-03 -.924E+02 -.892E+02 -.493E+02
                    -.909E+01 -.344E+01 -.731E+00  .147E+00  .460E+00  .535E+00
                     .110E+02  .102E+02  .149E+02  .102E+02  .320E+01 -.457E-01
                    -.665E+00 -.479E+00  .403E+00
time =  .36000E+01 -.313E-01 -.280E-01 -.190E-01 -.931E-02 -.369E-02 -.114E-02
                     .187E-04  .485E-03  .606E-03 -.951E+02 -.919E+02 -.508E+02
                    -.940E+01 -.356E+01 -.762E+00  .151E+00  .477E+00  .556E+00
                     .113E+02  .105E+02  .153E+02  .105E+02  .329E+01 -.467E-01
                    -.686E+00 -.495E+00  .421E+00
time =  .37000E+01 -.323E-01 -.289E-01 -.196E-01 -.962E-02 -.382E-02 -.119E-02
                     .175E-04  .502E-03  .628E-03 -.979E+02 -.946E+02 -.523E+02
                    -.971E+01 -.368E+01 -.793E+00  .154E+00  .495E+00  .577E+00
                     .117E+02  .108E+02  .158E+02  .108E+02  .339E+01 -.479E-01
                    -.708E+00 -.511E+00  .438E+00
time =  .38000E+01 -.332E-01 -.298E-01 -.202E-01 -.993E-02 -.395E-02 -.123E-02
                     .163E-04  .519E-03  .650E-03 -.101E+03 -.972E+02 -.538E+02
                    -.100E+02 -.381E+01 -.824E+00  .158E+00  .512E+00  .598E+00
                     .120E+02  .111E+02  .162E+02  .111E+02  .349E+01 -.492E-01
                    -.729E+00 -.526E+00  .455E+00
time =  .39000E+01 -.342E-01 -.307E-01 -.208E-01 -.102E-01 -.408E-02 -.127E-02
                     .151E-04  .536E-03  .672E-03 -.103E+03 -.999E+02 -.553E+02
                    -.103E+02 -.393E+01 -.855E+00  .161E+00  .529E+00  .619E+00
                     .124E+02  .115E+02  .167E+02  .114E+02  .358E+01 -.506E-01
                    -.751E+00 -.542E+00  .473E+00
time =  .40000E+01 -.352E-01 -.316E-01 -.214E-01 -.105E-01 -.421E-02 -.132E-02
                     .140E-04  .553E-03  .694E-03 -.106E+03 -.103E+03 -.567E+02
                    -.106E+02 -.405E+01 -.886E+00  .165E+00  .547E+00  .640E+00
                     .127E+02  .118E+02  .171E+02  .118E+02  .368E+01 -.521E-01
                    -.772E+00 -.558E+00  .490E+00
time =  .41000E+01 -.362E-01 -.324E-01 -.220E-01 -.109E-01 -.434E-02 -.136E-02
                     .129E-04  .570E-03  .717E-03 -.109E+03 -.105E+03 -.582E+02
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                    -.109E+02 -.417E+01 -.916E+00  .168E+00  .564E+00  .661E+00
                     .131E+02  .121E+02  .176E+02  .121E+02  .378E+01 -.538E-01
                    -.794E+00 -.573E+00  .507E+00
time =   .42000E+01 -.372E-01 -.333E-01 -.226E-01 -.112E-01 -.447E-02 -.140E-02
                     .119E-04  .587E-03  .739E-03 -.112E+03 -.108E+03 -.597E+02
                    -.112E+02 -.430E+01 -.947E+00  .172E+00  .582E+00  .682E+00
                     .134E+02  .124E+02  .180E+02  .124E+02  .387E+01 -.557E-01
                    -.816E+00 -.589E+00  .525E+00
time =   .43000E+01 -.381E-01 -.342E-01 -.232E-01 -.115E-01 -.460E-02 -.145E-02
                     .109E-04  .604E-03  .761E-03 -.115E+03 -.111E+03 -.612E+02
                    -.115E+02 -.442E+01 -.978E+00  .176E+00  .599E+00  .704E+00
                     .138E+02  .127E+02  .185E+02  .127E+02  .397E+01 -.576E-01
                    -.837E+00 -.605E+00  .542E+00
time =   .44000E+01 -.391E-01 -.351E-01 -.238E-01 -.118E-01 -.473E-02 -.149E-02
                     .987E-05  .622E-03  .783E-03 -.117E+03 -.113E+03 -.627E+02
                    -.118E+02 -.454E+01 -.101E+01  .179E+00  .617E+00  .725E+00
                     .141E+02  .130E+02  .189E+02  .130E+02  .406E+01 -.598E-01
                    -.859E+00 -.621E+00  .559E+00
time =   .45000E+01 -.401E-01 -.360E-01 -.244E-01 -.121E-01 -.486E-02 -.153E-02
                     .891E-05  .639E-03  .805E-03 -.120E+03 -.116E+03 -.642E+02
                    -.121E+02 -.466E+01 -.104E+01  .183E+00  .634E+00  .746E+00
                     .145E+02  .134E+02  .194E+02  .133E+02  .416E+01 -.620E-01
                    -.881E+00 -.637E+00  .576E+00
time =   .46000E+01 -.411E-01 -.368E-01 -.250E-01 -.124E-01 -.499E-02 -.158E-02
                     .799E-05  .656E-03  .828E-03 -.123E+03 -.119E+03 -.657E+02
                    -.125E+02 -.479E+01 -.107E+01  .187E+00  .652E+00  .767E+00
                     .148E+02  .137E+02  .198E+02  .136E+02  .425E+01 -.644E-01
                    -.903E+00 -.653E+00  .594E+00
time =   .47000E+01 -.421E-01 -.377E-01 -.256E-01 -.127E-01 -.512E-02 -.162E-02
                     .710E-05  .673E-03  .850E-03 -.126E+03 -.121E+03 -.672E+02
                    -.128E+02 -.491E+01 -.110E+01  .191E+00  .669E+00  .788E+00
                     .152E+02  .140E+02  .203E+02  .139E+02  .435E+01 -.670E-01
                    -.925E+00 -.669E+00  .611E+00
time =   .48000E+01 -.431E-01 -.386E-01 -.262E-01 -.130E-01 -.525E-02 -.166E-02
                     .625E-05  .691E-03  .872E-03 -.129E+03 -.124E+03 -.687E+02
                    -.131E+02 -.503E+01 -.113E+01  .195E+00  .687E+00  .810E+00
                     .156E+02  .143E+02  .208E+02  .142E+02  .444E+01 -.696E-01
                    -.947E+00 -.685E+00  .628E+00
time =   .49000E+01 -.440E-01 -.395E-01 -.269E-01 -.133E-01 -.538E-02 -.170E-02
                     .543E-05  .708E-03  .895E-03 -.131E+03 -.127E+03 -.702E+02
                    -.134E+02 -.515E+01 -.116E+01  .199E+00  .705E+00  .831E+00
                     .159E+02  .147E+02  .212E+02  .145E+02  .453E+01 -.725E-01
                    -.970E+00 -.701E+00  .645E+00
time =   .50000E+01 -.450E-01 -.404E-01 -.275E-01 -.136E-01 -.551E-02 -.175E-02
                     .465E-05  .726E-03  .917E-03 -.134E+03 -.129E+03 -.717E+02
                    -.137E+02 -.527E+01 -.119E+01  .203E+00  .723E+00  .852E+00
                     .163E+02  .150E+02  .217E+02  .148E+02  .463E+01 -.754E-01
                    -.992E+00 -.717E+00  .663E+00
time =   .51000E+01 -.460E-01 -.413E-01 -.281E-01 -.139E-01 -.564E-02 -.179E-02
                     .390E-05  .743E-03  .939E-03 -.137E+03 -.132E+03 -.731E+02
                    -.140E+02 -.539E+01 -.122E+01  .207E+00  .740E+00  .874E+00
                     .166E+02  .153E+02  .221E+02  .151E+02  .472E+01 -.785E-01
                    -.101E+01 -.733E+00  .680E+00
time =   .52000E+01 -.470E-01 -.422E-01 -.287E-01 -.142E-01 -.577E-02 -.183E-02
                     .319E-05  .760E-03  .962E-03 -.140E+03 -.135E+03 -.746E+02
                    -.143E+02 -.552E+01 -.125E+01  .211E+00  .758E+00  .895E+00
                     .170E+02  .156E+02  .226E+02  .154E+02  .481E+01 -.818E-01
                    -.104E+01 -.749E+00  .697E+00
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time =  .53000E+01 -.480E-01 -.430E-01 -.293E-01 -.146E-01 -.590E-02 -.188E-02
                    .252E-05  .778E-03  .984E-03 -.142E+03 -.137E+03 -.761E+02
                   -.146E+02 -.564E+01 -.128E+01  .215E+00  .776E+00  .917E+00
                    .173E+02  .160E+02  .230E+02  .157E+02  .491E+01 -.851E-01
                   -.106E+01 -.765E+00  .715E+00
time =  .54000E+01 -.490E-01 -.439E-01 -.299E-01 -.149E-01 -.603E-02 -.192E-02
                    .189E-05  .795E-03  .101E-02 -.145E+03 -.140E+03 -.776E+02
                   -.149E+02 -.576E+01 -.131E+01  .219E+00  .794E+00  .938E+00
                    .177E+02  .163E+02  .235E+02  .160E+02  .500E+01 -.887E-01
                   -.108E+01 -.782E+00  .732E+00
time =  .55000E+01 -.500E-01 -.448E-01 -.305E-01 -.152E-01 -.616E-02 -.196E-02
                    .129E-05  .813E-03  .103E-02 -.148E+03 -.143E+03 -.791E+02
                   -.152E+02 -.588E+01 -.134E+01  .223E+00  .812E+00  .960E+00
                    .181E+02  .166E+02  .239E+02  .163E+02  .509E+01 -.923E-01
                   -.111E+01 -.798E+00  .749E+00
time =  .56000E+01 -.509E-01 -.457E-01 -.311E-01 -.155E-01 -.629E-02 -.200E-02
                    .723E-06  .831E-03  .105E-02 -.151E+03 -.145E+03 -.806E+02
                   -.155E+02 -.600E+01 -.137E+01  .227E+00  .830E+00  .981E+00
                    .184E+02  .169E+02  .244E+02  .166E+02  .518E+01 -.961E-01
                   -.113E+01 -.814E+00  .766E+00
time =  .57000E+01 -.519E-01 -.466E-01 -.317E-01 -.158E-01 -.642E-02 -.205E-02
                    .196E-06  .848E-03  .107E-02 -.154E+03 -.148E+03 -.821E+02
                   -.158E+02 -.612E+01 -.140E+01  .232E+00  .848E+00  .100E+01
                    .188E+02  .173E+02  .249E+02  .169E+02  .528E+01 -.100E+00
                   -.115E+01 -.831E+00  .783E+00
time =  .58000E+01 -.529E-01 -.475E-01 -.323E-01 -.161E-01 -.655E-02 -.209E-02
                   -.293E-06  .866E-03  .110E-02 -.156E+03 -.151E+03 -.836E+02
                   -.161E+02 -.624E+01 -.143E+01  .236E+00  .866E+00  .102E+01
                    .191E+02  .176E+02  .253E+02  .172E+02  .537E+01 -.104E+00
                   -.117E+01 -.847E+00  .801E+00
time =  .59000E+01 -.539E-01 -.483E-01 -.329E-01 -.164E-01 -.668E-02 -.213E-02
                   -.745E-06  .884E-03  .112E-02 -.159E+03 -.154E+03 -.850E+02
                   -.164E+02 -.636E+01 -.146E+01  .240E+00  .884E+00  .105E+01
                    .195E+02  .179E+02  .258E+02  .175E+02  .546E+01 -.108E+00
                   -.120E+01 -.863E+00  .818E+00
time =  .60000E+01 -.549E-01 -.492E-01 -.335E-01 -.167E-01 -.680E-02 -.218E-02
                   -.116E-05  .901E-03  .114E-02 -.162E+03 -.156E+03 -.865E+02
                   -.167E+02 -.648E+01 -.149E+01  .245E+00  .902E+00  .107E+01
                    .199E+02  .183E+02  .262E+02  .178E+02  .555E+01 -.113E+00
                   -.122E+01 -.880E+00  .835E+00
time =  .61000E+01 -.559E-01 -.501E-01 -.341E-01 -.170E-01 -.693E-02 -.222E-02
                   -.154E-05  .919E-03  .117E-02 -.165E+03 -.159E+03 -.880E+02
                   -.170E+02 -.660E+01 -.152E+01  .249E+00  .920E+00  .109E+01
                    .203E+02  .186E+02  .267E+02  .181E+02  .564E+01 -.117E+00
                   -.124E+01 -.896E+00  .852E+00
time =  .62000E+01 -.569E-01 -.510E-01 -.347E-01 -.173E-01 -.706E-02 -.226E-02
                   -.205E-05  .937E-03  .119E-02 -.168E+03 -.162E+03 -.896E+02
                   -.172E+02 -.672E+01 -.155E+01  .253E+00  .938E+00  .111E+01
                    .207E+02  .189E+02  .271E+02  .186E+02  .573E+01 -.119E+00
                   -.127E+01 -.913E+00  .870E+00
time =  .63000E+01 -.579E-01 -.519E-01 -.353E-01 -.176E-01 -.719E-02 -.230E-02
                   -.282E-05  .954E-03  .121E-02 -.171E+03 -.164E+03 -.912E+02
                   -.175E+02 -.684E+01 -.158E+01  .256E+00  .956E+00  .113E+01
                    .212E+02  .193E+02  .276E+02  .190E+02  .582E+01 -.120E+00
                   -.129E+01 -.928E+00  .887E+00
time =  .64000E+01 -.590E-01 -.528E-01 -.359E-01 -.179E-01 -.732E-02 -.235E-02
                   -.369E-05  .972E-03  .123E-02 -.174E+03 -.167E+03 -.928E+02
                   -.177E+02 -.696E+01 -.161E+01  .259E+00  .973E+00  .115E+01
```

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                    .217E+02  .196E+02  .281E+02  .195E+02  .590E+01 -.123E+00
                   -.131E+01 -.944E+00  .905E+00
time =  .65000E+01 -.600E-01 -.538E-01 -.366E-01 -.182E-01 -.745E-02 -.239E-02
                   -.450E-05  .989E-03  .126E-02 -.177E+03 -.170E+03 -.944E+02
                   -.180E+02 -.708E+01 -.164E+01  .261E+00  .990E+00  .118E+01
                    .222E+02  .199E+02  .286E+02  .199E+02  .599E+01 -.126E+00
                   -.133E+01 -.959E+00  .922E+00
time =  .66000E+01 -.611E-01 -.547E-01 -.372E-01 -.185E-01 -.757E-02 -.243E-02
                   -.511E-05  .101E-02  .128E-02 -.180E+03 -.173E+03 -.961E+02
                   -.182E+02 -.719E+01 -.167E+01  .264E+00  .101E+01  .120E+01
                    .227E+02  .201E+02  .292E+02  .203E+02  .607E+01 -.131E+00
                   -.135E+01 -.974E+00  .939E+00
time =  .67000E+01 -.622E-01 -.557E-01 -.378E-01 -.188E-01 -.769E-02 -.247E-02
                   -.542E-05  .102E-02  .130E-02 -.183E+03 -.175E+03 -.978E+02
                   -.184E+02 -.730E+01 -.170E+01  .266E+00  .102E+01  .122E+01
                    .232E+02  .203E+02  .297E+02  .207E+02  .615E+01 -.137E+00
                   -.137E+01 -.990E+00  .956E+00
time =  .68000E+01 -.633E-01 -.566E-01 -.384E-01 -.191E-01 -.782E-02 -.251E-02
                   -.532E-05  .104E-02  .132E-02 -.186E+03 -.178E+03 -.994E+02
                   -.187E+02 -.742E+01 -.173E+01  .269E+00  .104E+01  .124E+01
                    .236E+02  .206E+02  .302E+02  .212E+02  .622E+01 -.145E+00
                   -.139E+01 -.101E+01  .973E+00
time =  .69000E+01 -.645E-01 -.576E-01 -.390E-01 -.194E-01 -.794E-02 -.255E-02
                   -.479E-05  .106E-02  .135E-02 -.188E+03 -.181E+03 -.101E+03
                   -.189E+02 -.753E+01 -.176E+01  .272E+00  .106E+01  .126E+01
                    .241E+02  .210E+02  .305E+02  .216E+02  .630E+01 -.154E+00
                   -.142E+01 -.102E+01  .989E+00
time =  .70000E+01 -.656E-01 -.586E-01 -.396E-01 -.197E-01 -.806E-02 -.259E-02
                   -.385E-05  .108E-02  .137E-02 -.191E+03 -.184E+03 -.102E+03
                   -.191E+02 -.764E+01 -.179E+01  .276E+00  .107E+01  .128E+01
                    .245E+02  .213E+02  .309E+02  .220E+02  .637E+01 -.163E+00
                   -.144E+01 -.104E+01  .101E+01
time =  .71000E+01 -.668E-01 -.596E-01 -.403E-01 -.200E-01 -.818E-02 -.263E-02
                   -.254E-05  .110E-02  .139E-02 -.193E+03 -.186E+03 -.104E+03
                   -.194E+02 -.774E+01 -.181E+01  .280E+00  .109E+01  .130E+01
                    .250E+02  .216E+02  .313E+02  .225E+02  .645E+01 -.172E+00
                   -.147E+01 -.106E+01  .102E+01
time =  .72000E+01 -.680E-01 -.607E-01 -.409E-01 -.203E-01 -.830E-02 -.267E-02
                   -.871E-06  .112E-02  .141E-02 -.196E+03 -.189E+03 -.105E+03
                   -.196E+02 -.785E+01 -.184E+01  .284E+00  .111E+01  .132E+01
                    .255E+02  .220E+02  .317E+02  .229E+02  .652E+01 -.183E+00
                   -.149E+01 -.107E+01  .104E+01
time =  .73000E+01 -.692E-01 -.617E-01 -.415E-01 -.205E-01 -.842E-02 -.271E-02
                    .118E-05  .113E-02  .144E-02 -.198E+03 -.192E+03 -.107E+03
                   -.198E+02 -.796E+01 -.186E+01  .288E+00  .112E+01  .134E+01
                    .260E+02  .223E+02  .320E+02  .233E+02  .659E+01 -.194E+00
                   -.151E+01 -.109E+01  .105E+01
time =  .74000E+01 -.704E-01 -.628E-01 -.421E-01 -.208E-01 -.854E-02 -.274E-02
                    .366E-05  .115E-02  .146E-02 -.201E+03 -.194E+03 -.108E+03
                   -.201E+02 -.806E+01 -.189E+01  .293E+00  .114E+01  .136E+01
                    .264E+02  .227E+02  .324E+02  .238E+02  .665E+01 -.207E+00
                   -.154E+01 -.111E+01  .107E+01
time =  .75000E+01 -.717E-01 -.638E-01 -.428E-01 -.211E-01 -.866E-02 -.278E-02
                    .669E-05  .117E-02  .149E-02 -.204E+03 -.197E+03 -.110E+03
                   -.203E+02 -.816E+01 -.191E+01  .298E+00  .116E+01  .138E+01
                    .269E+02  .231E+02  .328E+02  .242E+02  .672E+01 -.223E+00
                   -.157E+01 -.112E+01  .109E+01
time =  .76000E+01 -.728E-01 -.648E-01 -.434E-01 -.214E-01 -.877E-02 -.282E-02
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                    .103E-04  .119E-02  .151E-02 -.205E+03 -.198E+03 -.111E+03
                   -.205E+02 -.825E+01 -.193E+01  .304E+00  .118E+01  .140E+01
                    .274E+02  .234E+02  .331E+02  .245E+02  .676E+01 -.239E+00
                   -.159E+01 -.114E+01  .110E+01
time =  .77000E+01 -.737E-01 -.656E-01 -.439E-01 -.217E-01 -.889E-02 -.285E-02
                    .142E-04  .121E-02  .154E-02 -.206E+03 -.199E+03 -.111E+03
                   -.207E+02 -.833E+01 -.195E+01  .312E+00  .119E+01  .142E+01
                    .278E+02  .236E+02  .333E+02  .247E+02  .679E+01 -.255E+00
                   -.162E+01 -.116E+01  .112E+01
time =  .78000E+01 -.744E-01 -.662E-01 -.443E-01 -.219E-01 -.899E-02 -.288E-02
                    .177E-04  .123E-02  .156E-02 -.207E+03 -.200E+03 -.112E+03
                   -.209E+02 -.841E+01 -.197E+01  .319E+00  .121E+01  .144E+01
                    .281E+02  .238E+02  .334E+02  .248E+02  .681E+01 -.267E+00
                   -.164E+01 -.117E+01  .113E+01
time =  .79000E+01 -.750E-01 -.667E-01 -.446E-01 -.221E-01 -.909E-02 -.292E-02
                    .203E-04  .125E-02  .158E-02 -.207E+03 -.200E+03 -.112E+03
                   -.211E+02 -.849E+01 -.200E+01  .325E+00  .123E+01  .147E+01
                    .283E+02  .239E+02  .336E+02  .249E+02  .683E+01 -.276E+00
                   -.166E+01 -.119E+01  .115E+01
time =  .80000E+01 -.755E-01 -.671E-01 -.449E-01 -.222E-01 -.917E-02 -.295E-02
                    .220E-04  .127E-02  .161E-02 -.207E+03 -.201E+03 -.112E+03
                   -.212E+02 -.857E+01 -.202E+01  .329E+00  .125E+01  .149E+01
                    .285E+02  .240E+02  .336E+02  .249E+02  .684E+01 -.282E+00
                   -.167E+01 -.119E+01  .116E+01
time =  .81000E+01 -.759E-01 -.675E-01 -.451E-01 -.224E-01 -.925E-02 -.298E-02
                    .230E-04  .129E-02  .163E-02 -.208E+03 -.201E+03 -.113E+03
                   -.214E+02 -.863E+01 -.204E+01  .332E+00  .127E+01  .151E+01
                    .286E+02  .240E+02  .337E+02  .250E+02  .685E+01 -.285E+00
                   -.168E+01 -.120E+01  .118E+01
time =  .82000E+01 -.762E-01 -.677E-01 -.453E-01 -.225E-01 -.931E-02 -.300E-02
                    .233E-04  .130E-02  .165E-02 -.208E+03 -.201E+03 -.113E+03
                   -.215E+02 -.869E+01 -.206E+01  .334E+00  .128E+01  .152E+01
                    .287E+02  .241E+02  .338E+02  .250E+02  .685E+01 -.286E+00
                   -.169E+01 -.121E+01  .119E+01
time =  .83000E+01 -.765E-01 -.680E-01 -.454E-01 -.226E-01 -.937E-02 -.302E-02
                    .231E-04  .131E-02  .166E-02 -.208E+03 -.201E+03 -.113E+03
                   -.216E+02 -.874E+01 -.208E+01  .335E+00  .129E+01  .154E+01
                    .288E+02  .241E+02  .338E+02  .251E+02  .686E+01 -.287E+00
                   -.169E+01 -.121E+01  .121E+01
time =  .84000E+01 -.767E-01 -.682E-01 -.456E-01 -.227E-01 -.942E-02 -.304E-02
                    .226E-04  .132E-02  .168E-02 -.208E+03 -.201E+03 -.113E+03
                   -.216E+02 -.878E+01 -.210E+01  .336E+00  .130E+01  .155E+01
                    .289E+02  .242E+02  .339E+02  .251E+02  .687E+01 -.286E+00
                   -.169E+01 -.121E+01  .122E+01
time =  .85000E+01 -.769E-01 -.683E-01 -.457E-01 -.227E-01 -.946E-02 -.306E-02
                    .219E-04  .133E-02  .169E-02 -.209E+03 -.202E+03 -.113E+03
                   -.217E+02 -.881E+01 -.211E+01  .336E+00  .131E+01  .157E+01
                    .290E+02  .242E+02  .339E+02  .251E+02  .687E+01 -.285E+00
                   -.169E+01 -.121E+01  .123E+01
time =  .86000E+01 -.770E-01 -.684E-01 -.458E-01 -.228E-01 -.949E-02 -.307E-02
                    .210E-04  .134E-02  .170E-02 -.209E+03 -.202E+03 -.114E+03
                   -.218E+02 -.884E+01 -.213E+01  .336E+00  .132E+01  .158E+01
                    .290E+02  .242E+02  .339E+02  .251E+02  .688E+01 -.284E+00
                   -.169E+01 -.121E+01  .124E+01
time =  .87000E+01 -.771E-01 -.686E-01 -.459E-01 -.229E-01 -.952E-02 -.309E-02
                    .200E-04  .134E-02  .170E-02 -.209E+03 -.202E+03 -.114E+03
                   -.218E+02 -.887E+01 -.214E+01  .336E+00  .133E+01  .158E+01
                    .291E+02  .242E+02  .339E+02  .251E+02  .688E+01 -.283E+00
```

```
                    -.170E+01 -.121E+01  .125E+01
time =   .88000E+01 -.772E-01 -.686E-01 -.459E-01 -.229E-01 -.954E-02 -.310E-02
                     .190E-04  .135E-02  .171E-02 -.209E+03 -.202E+03 -.114E+03
                    -.219E+02 -.889E+01 -.215E+01  .335E+00  .133E+01  .159E+01
                     .291E+02  .243E+02  .339E+02  .251E+02  .688E+01 -.282E+00
                    -.170E+01 -.121E+01  .125E+01
time =   .89000E+01 -.773E-01 -.687E-01 -.460E-01 -.229E-01 -.956E-02 -.311E-02
                     .180E-04  .135E-02  .172E-02 -.209E+03 -.202E+03 -.114E+03
                    -.219E+02 -.891E+01 -.216E+01  .335E+00  .133E+01  .160E+01
                     .291E+02  .243E+02  .340E+02  .251E+02  .688E+01 -.282E+00
                    -.170E+01 -.121E+01  .126E+01
time =   .90000E+01 -.774E-01 -.688E-01 -.460E-01 -.230E-01 -.958E-02 -.311E-02
                     .171E-04  .136E-02  .172E-02 -.209E+03 -.202E+03 -.114E+03
                    -.219E+02 -.893E+01 -.216E+01  .334E+00  .134E+01  .160E+01
                     .291E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.281E+00
                    -.169E+01 -.121E+01  .126E+01
time =   .91000E+01 -.774E-01 -.688E-01 -.461E-01 -.230E-01 -.959E-02 -.312E-02
                     .162E-04  .136E-02  .172E-02 -.209E+03 -.202E+03 -.114E+03
                    -.219E+02 -.894E+01 -.217E+01  .333E+00  .134E+01  .160E+01
                     .292E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.280E+00
                    -.169E+01 -.121E+01  .127E+01
time =   .92000E+01 -.775E-01 -.689E-01 -.461E-01 -.230E-01 -.961E-02 -.313E-02
                     .153E-04  .136E-02  .173E-02 -.209E+03 -.202E+03 -.114E+03
                    -.220E+02 -.895E+01 -.217E+01  .333E+00  .134E+01  .161E+01
                     .292E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.279E+00
                    -.169E+01 -.121E+01  .127E+01
time =   .93000E+01 -.775E-01 -.689E-01 -.461E-01 -.230E-01 -.962E-02 -.313E-02
                     .146E-04  .136E-02  .173E-02 -.209E+03 -.202E+03 -.114E+03
                    -.220E+02 -.896E+01 -.218E+01  .332E+00  .134E+01  .161E+01
                     .292E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.279E+00
                    -.169E+01 -.121E+01  .127E+01
time =   .94000E+01 -.775E-01 -.689E-01 -.461E-01 -.230E-01 -.962E-02 -.313E-02
                     .139E-04  .136E-02  .173E-02 -.209E+03 -.202E+03 -.114E+03
                    -.220E+02 -.897E+01 -.218E+01  .332E+00  .135E+01  .161E+01
                     .292E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.278E+00
                    -.169E+01 -.121E+01  .128E+01
time =   .95000E+01 -.776E-01 -.689E-01 -.461E-01 -.230E-01 -.963E-02 -.314E-02
                     .133E-04  .136E-02  .173E-02 -.209E+03 -.202E+03 -.114E+03
                    -.220E+02 -.897E+01 -.218E+01  .331E+00  .135E+01  .161E+01
                     .292E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.278E+00
                    -.169E+01 -.121E+01  .128E+01
time =   .96000E+01 -.776E-01 -.690E-01 -.462E-01 -.231E-01 -.964E-02 -.314E-02
                     .128E-04  .137E-02  .173E-02 -.209E+03 -.202E+03 -.114E+03
                    -.220E+02 -.898E+01 -.219E+01  .331E+00  .135E+01  .161E+01
                     .292E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.278E+00
                    -.169E+01 -.121E+01  .128E+01
time =   .97000E+01 -.776E-01 -.690E-01 -.462E-01 -.231E-01 -.964E-02 -.314E-02
                     .123E-04  .137E-02  .174E-02 -.209E+03 -.202E+03 -.114E+03
                    -.220E+02 -.898E+01 -.219E+01  .330E+00  .135E+01  .162E+01
                     .292E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.277E+00
                    -.169E+01 -.121E+01  .128E+01
time =   .98000E+01 -.776E-01 -.690E-01 -.462E-01 -.231E-01 -.964E-02 -.315E-02
                     .119E-04  .137E-02  .174E-02 -.209E+03 -.202E+03 -.114E+03
                    -.220E+02 -.899E+01 -.219E+01  .330E+00  .135E+01  .162E+01
                     .292E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.277E+00
                    -.169E+01 -.121E+01  .128E+01
time =   .99000E+01 -.776E-01 -.690E-01 -.462E-01 -.231E-01 -.965E-02 -.315E-02
                     .115E-04  .137E-02  .174E-02 -.209E+03 -.202E+03 -.114E+03
```

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                    -.220E+02 -.899E+01 -.219E+01  .330E+00  .135E+01  .162E+01
                     .292E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.277E+00
                    -.169E+01 -.121E+01  .128E+01
time =  .10000E+02  -.776E-01 -.690E-01 -.462E-01 -.231E-01 -.965E-02 -.315E-02
                     .112E-04  .137E-02  .174E-02 -.209E+03 -.202E+03 -.114E+03
                    -.220E+02 -.899E+01 -.219E+01  .329E+00  .135E+01  .162E+01
                     .292E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.277E+00
                    -.169E+01 -.121E+01  .128E+01
time =  .10100E+02  -.776E-01 -.690E-01 -.462E-01 -.231E-01 -.965E-02 -.315E-02
                     .109E-04  .137E-02  .174E-02 -.209E+03 -.202E+03 -.114E+03
                    -.220E+02 -.899E+01 -.219E+01  .329E+00  .135E+01  .162E+01
                     .292E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.277E+00
                    -.169E+01 -.121E+01  .128E+01
time =  .10200E+02  -.776E-01 -.690E-01 -.462E-01 -.231E-01 -.965E-02 -.315E-02
                     .107E-04  .137E-02  .174E-02 -.209E+03 -.202E+03 -.114E+03
                    -.220E+02 -.900E+01 -.219E+01  .329E+00  .135E+01  .162E+01
                     .292E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.277E+00
                    -.169E+01 -.121E+01  .128E+01
time =  .10300E+02  -.776E-01 -.690E-01 -.462E-01 -.231E-01 -.966E-02 -.315E-02
                     .105E-04  .137E-02  .174E-02 -.209E+03 -.202E+03 -.114E+03
                    -.220E+02 -.900E+01 -.220E+01  .329E+00  .135E+01  .162E+01
                     .292E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.277E+00
                    -.169E+01 -.121E+01  .128E+01
time =  .10400E+02  -.777E-01 -.690E-01 -.462E-01 -.231E-01 -.966E-02 -.315E-02
                     .103E-04  .137E-02  .174E-02 -.209E+03 -.202E+03 -.114E+03
                    -.220E+02 -.900E+01 -.220E+01  .329E+00  .135E+01  .162E+01
                     .292E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.277E+00
                    -.169E+01 -.121E+01  .129E+01
time =  .10500E+02  -.777E-01 -.690E-01 -.462E-01 -.231E-01 -.966E-02 -.315E-02
                     .101E-04  .137E-02  .174E-02 -.209E+03 -.202E+03 -.114E+03
                    -.220E+02 -.900E+01 -.220E+01  .329E+00  .135E+01  .162E+01
                     .292E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.277E+00
                    -.169E+01 -.121E+01  .129E+01
time =  .10600E+02  -.777E-01 -.690E-01 -.462E-01 -.231E-01 -.966E-02 -.315E-02
                     .100E-04  .137E-02  .174E-02 -.209E+03 -.202E+03 -.114E+03
                    -.220E+02 -.900E+01 -.220E+01  .328E+00  .135E+01  .162E+01
                     .292E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.277E+00
                    -.169E+01 -.121E+01  .129E+01
time =  .10700E+02  -.777E-01 -.690E-01 -.462E-01 -.231E-01 -.966E-02 -.315E-02
                     .990E-05  .137E-02  .174E-02 -.209E+03 -.202E+03 -.114E+03
                    -.220E+02 -.900E+01 -.220E+01  .328E+00  .135E+01  .162E+01
                     .292E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.276E+00
                    -.169E+01 -.121E+01  .129E+01
time =  .10800E+02  -.777E-01 -.690E-01 -.462E-01 -.231E-01 -.966E-02 -.315E-02
                     .981E-05  .137E-02  .174E-02 -.209E+03 -.202E+03 -.114E+03
                    -.220E+02 -.900E+01 -.220E+01  .328E+00  .135E+01  .162E+01
                     .292E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.276E+00
                    -.169E+01 -.121E+01  .129E+01
time =  .10900E+02  -.777E-01 -.690E-01 -.462E-01 -.231E-01 -.966E-02 -.315E-02
                     .973E-05  .137E-02  .174E-02 -.209E+03 -.202E+03 -.114E+03
                    -.220E+02 -.900E+01 -.220E+01  .328E+00  .135E+01  .162E+01
                     .292E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.276E+00
                    -.169E+01 -.121E+01  .129E+01
time =  .11000E+02  -.777E-01 -.690E-01 -.462E-01 -.231E-01 -.966E-02 -.315E-02
                     .966E-05  .137E-02  .174E-02 -.209E+03 -.202E+03 -.114E+03
                    -.220E+02 -.900E+01 -.220E+01  .328E+00  .135E+01  .162E+01
                     .292E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.276E+00
                    -.169E+01 -.121E+01  .129E+01
```

```
time =  .11100E+02 -.777E-01 -.690E-01 -.462E-01 -.231E-01 -.966E-02 -.315E-02
                    .961E-05  .137E-02  .174E-02 -.209E+03 -.202E+03 -.114E+03
                   -.220E+02 -.900E+01 -.220E+01  .328E+00  .135E+01  .162E+01
                    .292E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.276E+00
                   -.169E+01 -.121E+01  .129E+01
time =  .11200E+02 -.777E-01 -.690E-01 -.462E-01 -.231E-01 -.966E-02 -.315E-02
                    .956E-05  .137E-02  .174E-02 -.209E+03 -.202E+03 -.114E+03
                   -.220E+02 -.900E+01 -.220E+01  .328E+00  .135E+01  .162E+01
                    .292E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.276E+00
                   -.169E+01 -.121E+01  .129E+01
time =  .11300E+02 -.777E-01 -.690E-01 -.462E-01 -.231E-01 -.966E-02 -.315E-02
                    .952E-05  .137E-02  .174E-02 -.209E+03 -.202E+03 -.114E+03
                   -.220E+02 -.900E+01 -.220E+01  .328E+00  .135E+01  .162E+01
                    .292E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.276E+00
                   -.169E+01 -.121E+01  .129E+01
time =  .11400E+02 -.777E-01 -.690E-01 -.462E-01 -.231E-01 -.966E-02 -.315E-02
                    .949E-05  .137E-02  .174E-02 -.209E+03 -.202E+03 -.114E+03
                   -.220E+02 -.900E+01 -.220E+01  .328E+00  .135E+01  .162E+01
                    .292E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.276E+00
                   -.169E+01 -.121E+01  .129E+01
time =  .11500E+02 -.777E-01 -.690E-01 -.462E-01 -.231E-01 -.966E-02 -.315E-02
                    .946E-05  .137E-02  .174E-02 -.209E+03 -.202E+03 -.114E+03
                   -.220E+02 -.900E+01 -.220E+01  .328E+00  .135E+01  .162E+01
                    .292E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.276E+00
                   -.169E+01 -.121E+01  .129E+01
time =  .11600E+02 -.777E-01 -.690E-01 -.462E-01 -.231E-01 -.966E-02 -.315E-02
                    .943E-05  .137E-02  .174E-02 -.209E+03 -.202E+03 -.114E+03
                   -.220E+02 -.900E+01 -.220E+01  .328E+00  .135E+01  .162E+01
                    .292E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.276E+00
                   -.169E+01 -.121E+01  .129E+01
time =  .11700E+02 -.777E-01 -.690E-01 -.462E-01 -.231E-01 -.966E-02 -.315E-02
                    .941E-05  .137E-02  .174E-02 -.209E+03 -.202E+03 -.114E+03
                   -.220E+02 -.900E+01 -.220E+01  .328E+00  .135E+01  .162E+01
                    .292E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.276E+00
                   -.169E+01 -.121E+01  .129E+01
time =  .11800E+02 -.777E-01 -.690E-01 -.462E-01 -.231E-01 -.966E-02 -.315E-02
                    .939E-05  .137E-02  .174E-02 -.209E+03 -.202E+03 -.114E+03
                   -.220E+02 -.900E+01 -.220E+01  .328E+00  .135E+01  .162E+01
                    .292E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.276E+00
                   -.169E+01 -.121E+01  .129E+01
time =  .11900E+02 -.777E-01 -.690E-01 -.462E-01 -.231E-01 -.966E-02 -.315E-02
                    .938E-05  .137E-02  .174E-02 -.209E+03 -.202E+03 -.114E+03
                   -.220E+02 -.900E+01 -.220E+01  .328E+00  .135E+01  .162E+01
                    .292E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.276E+00
                   -.169E+01 -.121E+01  .129E+01
time =  .12000E+02 -.777E-01 -.690E-01 -.462E-01 -.231E-01 -.966E-02 -.315E-02
                    .937E-05  .137E-02  .174E-02 -.209E+03 -.202E+03 -.114E+03
                   -.220E+02 -.900E+01 -.220E+01  .328E+00  .135E+01  .162E+01
                    .292E+02  .243E+02  .340E+02  .252E+02  .689E+01 -.276E+00
                   -.169E+01 -.121E+01  .129E+01
time =  .12100E+02 -.777E-01 -.690E-01 -.462E-01 -.231E-01 -.966E-02 -.315E-02
                    .936E-05  .137E-02  .174E-02 -.209E+03 -.202E+03 -.114E+03
                   -.220E+02 -.900E+01 -.220E+01  .328E+00  .135E+01  .162E+01
                    .292E+02  .243E+02  .340E+02  .252E+02  .690E+01 -.276E+00
                   -.169E+01 -.121E+01  .129E+01
time =  .12200E+02 -.777E-01 -.690E-01 -.462E-01 -.231E-01 -.966E-02 -.315E-02
                    .935E-05  .137E-02  .174E-02 -.209E+03 -.202E+03 -.114E+03
                   -.220E+02 -.900E+01 -.220E+01  .328E+00  .135E+01  .162E+01
```

```
                    .292E+02  .243E+02  .340E+02  .252E+02  .690E+01 -.276E+00
                   -.169E+01 -.121E+01  .129E+01
time =  .12300E+02 -.777E-01 -.690E-01 -.462E-01 -.231E-01 -.966E-02 -.315E-02
                    .934E-05  .137E-02  .174E-02 -.209E+03 -.202E+03 -.114E+03
                   -.220E+02 -.900E+01 -.220E+01  .328E+00  .135E+01  .162E+01
                    .292E+02  .243E+02  .340E+02  .252E+02  .690E+01 -.276E+00
                   -.169E+01 -.121E+01  .129E+01
```

Problem 3.

A rectangular plate of elastic-plastic material with Mises criterion subjected to sinusoidal loadings

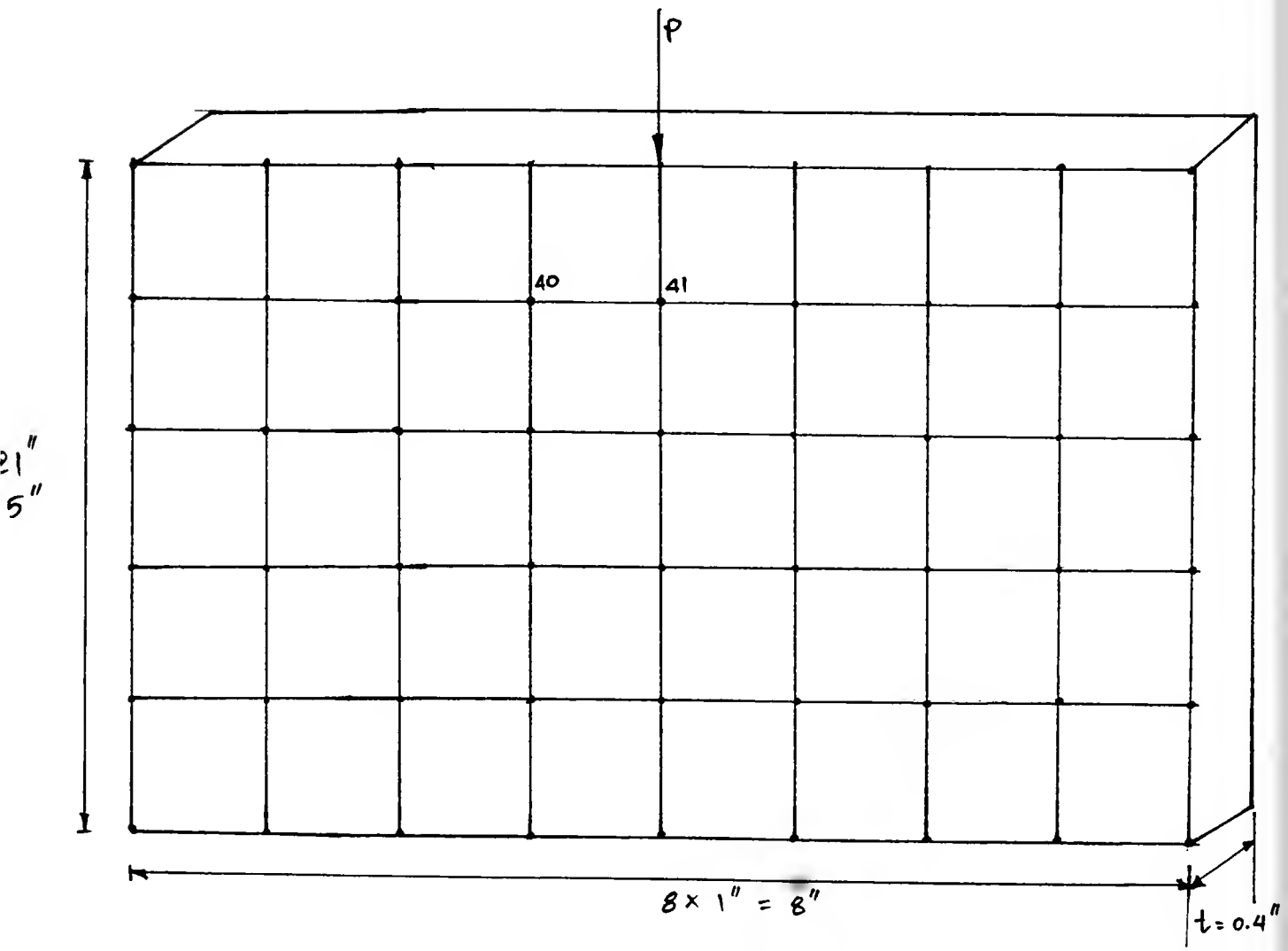
- **Problem description and loading functions**
- **Deflection and stress plots**
- **Input file for Soild2D**
- **Sample output of Soild2D**

Problem description and loading functions

2D Straight Edge Boundary with sinusoidal force (J2 material)

Input:

1. Geometry and finite element mesh are shown below.



2. Material Properites are shown as the followings:

E	=	9000 psi
υ	=	0.3
ρ	=	4.67e-2 lb-sec^2/in^4
Ft	=	40 psi (tensile strength)
Et	=	500 psi
plate tickness	=	0.4 in

Assumed kinematic work-hardening J2 material on plane stress case.

3. Impulsive load function is are shown in the next following page.

$$F(t) = \mathrm{A}\sin(\Omega * n\Delta t)$$

A = -45 lb

Ω = 17.6 rad/sec

4. The input data file and output result are shown after load function.

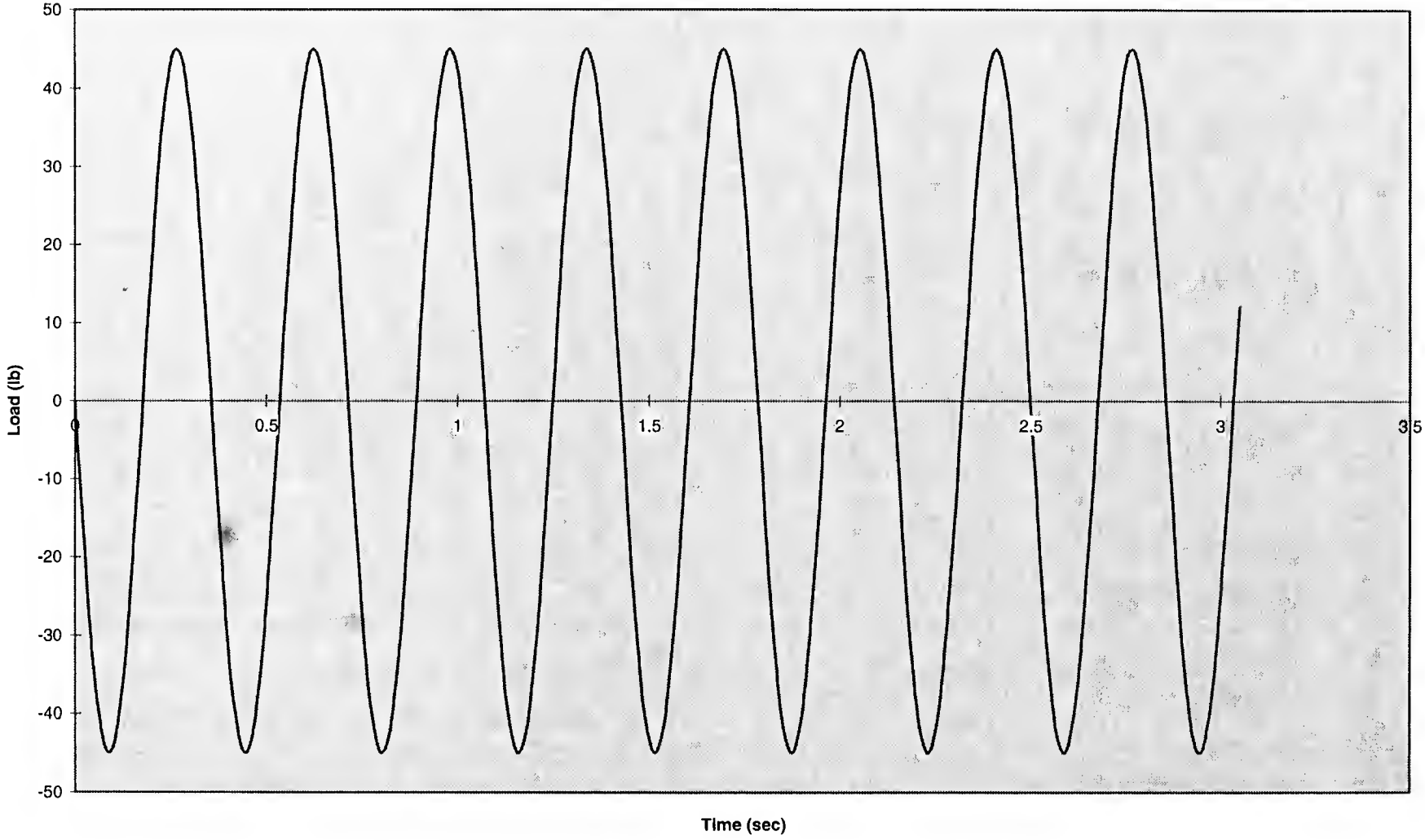
Problem results

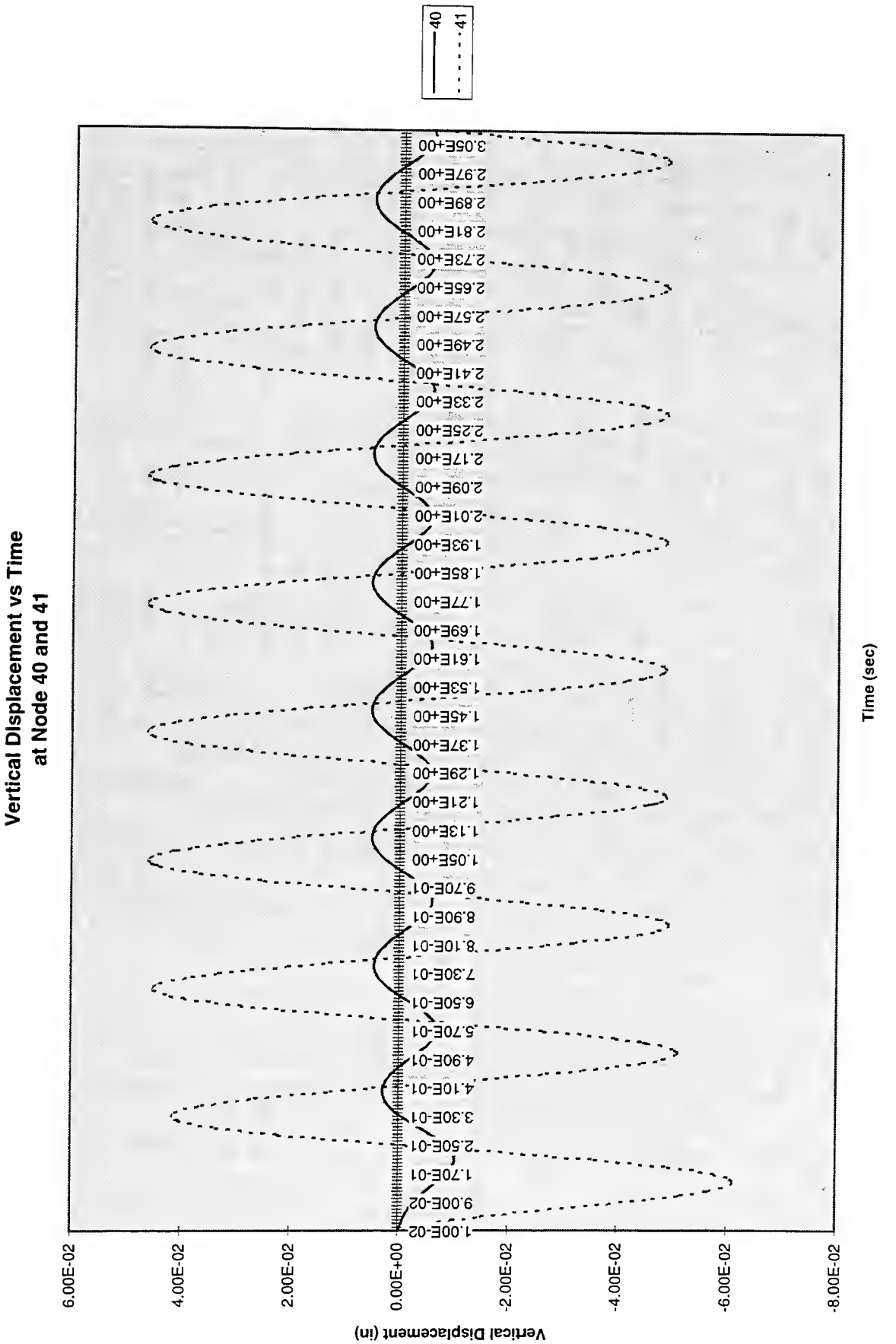
The vertical settlements are plotted against time.

\

Deflection and stress plots

Sinusoidal Load Function




Vertical Displacement vs Time
at Node 40 and 41
40
41
Vertical Displacement (in)
Time (sec)
6.00E-02
4.00E-02
2.00E-02
0.00E+00
-2.00E-02
-4.00E-02
-6.00E-02
-8.00E-02
1.00E-02
9.00E-02
1.70E-01
2.50E-01
3.30E-01
4.10E-01
4.90E-01
5.70E-01
6.50E-01
7.30E-01
8.10E-01
8.90E-01
9.70E-01
1.05E+00
1.13E+00
1.21E+00
1.29E+00
1.37E+00
1.45E+00
1.53E+00
1.61E+00
1.69E+00
1.77E+00
1.85E+00
1.93E+00
2.01E+00
2.09E+00
2.17E+00
2.25E+00
2.33E+00
2.41E+00
2.49E+00
2.57E+00
2.65E+00
2.73E+00
2.81E+00
2.89E+00
2.97E+00
3.05E+00

Input file for Solid2D

```
2D Straight edge boundary w/ sinusoidal load on J2 material
100 54 40 1 3 2 700000  1.e-4  1.e+3  1.e-10  0.
0 2 0 1 1
1      0.     0.          1   1
2      1.     0.          1   1
3      2.     0.          1   1
4      3.     0.          1   1
5      4.     0.          1   1
6      5.     0.          1   1
7      6.     0.          1   1
8      7.     0.          1   1
9      8.     0.          1   1
10     0.     1.          1   0
11     1.     1.          0   0
12     2.     1.          0   0
13     3.     1.          0   0
14     4.     1.          0   0
15     5.     1.          0   0
16     6.     1.          0   0
17     7.     1.          0   0
18     8.     1.          1   0
19     0.     2.          1   0
20     1.     2.          0   0
21     2.     2.          0   0
22     3.     2.          0   0
23     4.     2.          0   0
24     5.     2.          0   0
25     6.     2.          0   0
26     7.     2.          0   0
27     8.     2.          1   0
28     0.     3.          1   0
29     1.     3.          0   0
30     2.     3.          0   0
31     3.     3.          0   0
32     4.     3.          0   0
33     5.     3.          0   0
34     6.     3.          0   0
35     7.     3.          0   0
36     8.     3.          1   0
37     0.     4.          1   0
38     1.     4.          0   0
39     2.     4.          0   0
40     3.     4.          0   0
41     4.     4.          0   0
42     5.     4.          0   0
43     6.     4.          0   0
44     7.     4.          0   0
45     8.     4.          1   0
46     0.     5.          1   0
47     1.     5.          0   0
48     2.     5.          0   0
49     3.     5.          0   0
50     4.     5.          0   0
51     5.     5.          0   0
52     6.     5.          0   0
53     7.     5.          0   0
54     8.     5.          1   0
1  1  2  11  10     1  1  1  1  1
2  2  3  12  11     1  1  2  1  1
3  3  4  13  12     1  1  3  1  1
```

```
4  4  5  14  13     1  1  4  1  1
5  5  6  15  14     1  1  5  1  1
6  6  7  16  15     1  1  6  1  1
7  7  8  17  16     1  1  7  1  1
8  8  9  18  17     1  1  8  1  1
9   10  11  20  19    1  2  1  1  1
10  11  12  21  20    1  2  2  1  1
11  12  13  22  21    1  2  3  1  1
12  13  14  23  22    1  2  4  1  1
13  14  15  24  23    1  2  5  1  1
14  15  16  25  24    1  2  6  1  1
15  16  17  26  25    1  2  7  1  1
16  17  18  27  26    1  2  8  1  1
17  19  20  29  28    1  3  1  1  1
18  20  21  30  29    1  3  2  1  1
19  21  22  31  30    1  3  3  1  1
20  22  23  32  31    1  3  4  1  1
21  23  24  33  32    1  3  5  1  1
22  24  25  34  33    1  3  6  1  1
23  25  26  35  34    1  3  7  1  1
24  26  27  36  35    1  3  8  1  1
25  28  29  38  37    1  4  1  1  1
26  29  30  39  38    1  4  2  1  1
27  30  31  40  39    1  4  3  1  1
28  31  32  41  40    1  4  4  1  1
29  32  33  42  41    1  4  5  1  1
30  33  34  43  42    1  4  6  1  1
31  34  35  44  43    1  4  7  1  1
32  35  36  45  44    1  4  8  1  1
33  37  38  47  46    1  5  1  1  1
34  38  39  48  47    1  5  2  1  1
35  39  40  49  48    1  5  3  1  1
36  40  41  50  49    1  5  4  1  1
37  41  42  51  50    1  5  5  1  1
38  42  43  52  51    1  5  6  1  1
39  43  44  53  52    1  5  7  1  1
40  44  45  54  53    1  5  8  1  1
1 2 4.67e-2  9000.0  0.30  300.
0.  0.  3   500.   0.  0.4
1
50 2  -45. 17.6

40 0 2
41 0 2
42 0 2
```

Sample output of Solid2D

card 1 2D Straight edge boundary w/ sinusoidal load on J2 material

---

card 2 parameter card

no of time-steps skipped between outputs = 100
number of nodes = 54
number of elements = 40
number of materials = 1
number of output req = 3
no. of d.o.f/node = 2
no. of time steps = 700000
time increment = .100E-03
coeff of mass damping = .100E+04
tolerance limit = .100E-09
acceleration of gravity = .00000

card 3 index card

index for accel. = 0
index for force = 2
index for I. C. = 0
index for mesh output(1) or not(0) = 1
index for plane stress(1) or strain(2) = 1

card 4 nodal point data

node no.	x-ordinate	y-ordinate	ifx	ify
1	.000	.000	1	1
2	1.000	.000	1	1
3	2.000	.000	1	1
4	3.000	.000	1	1
5	4.000	.000	1	1
6	5.000	.000	1	1
7	6.000	.000	1	1
8	7.000	.000	1	1
9	8.000	.000	1	1
10	.000	1.000	1	0
11	1.000	1.000	0	0
12	2.000	1.000	0	0
13	3.000	1.000	0	0
14	4.000	1.000	0	0
15	5.000	1.000	0	0
16	6.000	1.000	0	0
17	7.000	1.000	0	0
18	8.000	1.000	1	0
19	.000	2.000	1	0
20	1.000	2.000	0	0
21	2.000	2.000	0	0
22	3.000	2.000	0	0
23	4.000	2.000	0	0
24	5.000	2.000	0	0
25	6.000	2.000	0	0
26	7.000	2.000	0	0
27	8.000	2.000	1	0
28	.000	3.000	1	0
29	1.000	3.000	0	0
30	2.000	3.000	0	0
31	3.000	3.000	0	0
32	4.000	3.000	0	0
33	5.000	3.000	0	0
34	6.000	3.000	0	0
35	7.000	3.000	0	0

36	8.000	3.000	1	0
37	.000	4.000	1	0
38	1.000	4.000	0	0
39	2.000	4.000	0	0
40	3.000	4.000	0	0
41	4.000	4.000	0	0
42	5.000	4.000	0	0
43	6.000	4.000	0	0
44	7.000	4.000	0	0
45	8.000	4.000	1	0
46	.000	5.000	1	0
47	1.000	5.000	0	0
48	2.000	5.000	0	0
49	3.000	5.000	0	0
50	4.000	5.000	0	0
51	5.000	5.000	0	0
52	6.000	5.000	0	0
53	7.000	5.000	0	0
54	8.000	5.000	1	0

card 5 element data

ele. no.	node-1	node-2	node-3	node-4	mat-typ	row-no	col-no	ele-cond.
1	1	2	11	10	1	1	1	1
2	2	3	12	11	1	1	2	1
3	3	4	13	12	1	1	3	1
4	4	5	14	13	1	1	4	1
5	5	6	15	14	1	1	5	1
6	6	7	16	15	1	1	6	1
7	7	8	17	16	1	1	7	1
8	8	9	18	17	1	1	8	1
9	10	11	20	19	1	2	1	1
10	11	12	21	20	1	2	2	1
11	12	13	22	21	1	2	3	1
12	13	14	23	22	1	2	4	1
13	14	15	24	23	1	2	5	1
14	15	16	25	24	1	2	6	1
15	16	17	26	25	1	2	7	1
16	17	18	27	26	1	2	8	1
17	19	20	29	28	1	3	1	1
18	20	21	30	29	1	3	2	1
19	21	22	31	30	1	3	3	1
20	22	23	32	31	1	3	4	1
21	23	24	33	32	1	3	5	1
22	24	25	34	33	1	3	6	1
23	25	26	35	34	1	3	7	1
24	26	27	36	35	1	3	8	1
25	28	29	38	37	1	4	1	1
26	29	30	39	38	1	4	2	1
27	30	31	40	39	1	4	3	1
28	31	32	41	40	1	4	4	1
29	32	33	42	41	1	4	5	1
30	33	34	43	42	1	4	6	1
31	34	35	44	43	1	4	7	1
32	35	36	45	44	1	4	8	1
33	37	38	47	46	1	5	1	1
34	38	39	48	47	1	5	2	1
35	39	40	49	48	1	5	3	1
36	40	41	50	49	1	5	4	1
37	41	42	51	50	1	5	5	1
38	42	43	52	51	1	5	6	1

39	43	44	53	52	1	5	7	1
40	44	45	54	53	1	5	8	1

card 6 & 7 material property data

material group no.	material type no.	mass density	Youngs modulus	Poisson ratio	tensile strength
1	2	.4670E-01	.9000E+04	.300	.3000E+03

cohesion	phi angle	yield criterion	tangent modulus	hardening rule	thickness(b)
.0000E+00	.00	3	.5000E+03	.000	.400

card 14 sinusoidal force information

node no.	x-(1),y-(2),z-(3)	ampli.	freq.
50	2	-.4500E+02	17.6

card 21 stress output information card

seq.	node#	d-(0),v-(1),a-(2),sig-(3)	x(1),y(2),xy(3)
1	40	0	2
2	41	0	2
3	42	0	2

nstep= 1000

Plastic element no [element no.Gauss point no] =

1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4
3.1	3.2	3.3	3.4	4.1	4.2	4.3	4.4
5.1	5.2	5.3	5.4	6.1	6.2	6.3	6.4
7.1	7.2	7.3	7.4	8.1	8.2	8.3	8.4
9.1	9.2	9.3	9.4	10.1	10.2	10.3	10.4
11.1	11.2	11.3	11.4	12.1	12.2	12.3	12.4
13.1	13.2	13.3	13.4	14.1	14.2	14.3	14.4
15.1	15.2	15.3	15.4	16.1	16.2	16.3	16.4
17.1	17.2	17.3	17.4	18.1	18.2	18.3	18.4
19.1	19.2	19.3	19.4	20.1	20.2	20.3	20.4
21.1	21.2	21.3	21.4	22.1	22.2	22.3	22.4
23.1	23.2	23.3	23.4	24.1	24.2	24.3	24.4
25.1	25.2	25.3	25.4	26.1	26.2	26.3	26.4
27.1	27.2	27.3	27.4	28.1	28.2	28.3	28.4
29.1	29.2	29.3	29.4	30.1	30.2	30.3	30.4
31.1	31.2	31.3	31.4	32.1	32.2	32.3	32.4
33.1	33.2	33.3	33.4	34.1	34.2	34.3	34.4
35.1	35.2	35.3	35.4	36.1	36.2	36.3	36.4
37.1	37.2	37.3	37.4	38.1	38.2	38.3	38.4
39.1	39.2	39.3	39.4	40.1	40.2	40.3	40.4

nstep= 2000

Plastic element no [element no.Gauss point no] =

1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4
3.1	3.2	3.3	3.4	4.1	4.2	4.3	4.4
5.1	5.2	5.3	5.4	6.1	6.2	6.3	6.4
7.1	7.2	7.3	7.4	8.1	8.2	8.3	8.4
9.1	9.2	9.3	9.4	10.1	10.2	10.3	10.4
11.1	11.2	11.3	11.4	12.1	12.2	12.3	12.4
13.1	13.2	13.3	13.4	14.1	14.2	14.3	14.4
15.1	15.2	15.3	15.4	16.1	16.2	16.3	16.4
17.1	17.2	17.3	17.4	18.1	18.2	18.3	18.4
19.1	19.2	19.3	19.4	20.1	20.2	20.3	20.4
21.1	21.2	21.3	21.4	22.1	22.2	22.3	22.4
23.1	23.2	23.3	23.4	24.1	24.2	24.3	24.4
25.1	25.2	25.3	25.4	26.1	26.2	26.3	26.4

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    27.1    27.2    27.3    27.4    28.1    28.2    28.3    28.4
    29.1    29.2    29.3    29.4    30.1    30.2    30.3    30.4
    31.1    31.2    31.3    31.4    32.1    32.2    32.3    32.4
    33.1    33.2    33.3    33.4    34.1    34.2    34.3    34.4
    35.1    35.2    35.3    35.4    36.1    36.2    36.3    36.4
    37.1    37.2    37.3    37.4    38.1    38.2    38.3    38.4
    39.1    39.2    39.3    39.4    40.1    40.2    40.3    40.4
nstep=       3000

  Plastic element no [element no.Gauss point no] =
     1.1     1.2     1.3     1.4     2.1     2.2     2.3     2.4
     3.1     3.2     3.3     3.4     4.1     4.2     4.3     4.4
     5.1     5.2     5.3     5.4     6.1     6.2     6.3     6.4
     7.1     7.2     7.3     7.4     8.1     8.2     8.3     8.4
     9.1     9.2     9.3     9.4    10.1    10.2    10.3    10.4
    11.1    11.2    11.3    11.4    12.1    12.2    12.3    12.4
    13.1    13.2    13.3    13.4    14.1    14.2    14.3    14.4
    15.1    15.2    15.3    15.4    16.1    16.2    16.3    16.4
    17.1    17.2    17.3    17.4    18.1    18.2    18.3    18.4
    19.1    19.2    19.3    19.4    20.1    20.2    20.3    20.4
    21.1    21.2    21.3    21.4    22.1    22.2    22.3    22.4
    23.1    23.2    23.3    23.4    24.1    24.2    24.3    24.4
    25.1    25.2    25.3    25.4    26.1    26.2    26.3    26.4
    27.1    27.2    27.3    27.4    28.1    28.2    28.3    28.4
    29.1    29.2    29.3    29.4    30.1    30.2    30.3    30.4
    31.1    31.2    31.3    31.4    32.1    32.2    32.3    32.4
    33.1    33.2    33.3    33.4    34.1    34.2    34.3    34.4
    35.1    35.2    35.3    35.4    36.1    36.2    36.3    36.4
    37.1    37.2    37.3    37.4    38.1    38.2    38.3    38.4
    39.1    39.2    39.3    39.4    40.1    40.2    40.3    40.4
nstep=       4000

  Plastic element no [element no.Gauss point no] =
     1.1     1.2     1.3     1.4     2.1     2.2     2.3     2.4
     3.1     3.2     3.3     3.4     4.1     4.2     4.3     4.4
     5.1     5.2     5.3     5.4     6.1     6.2     6.3     6.4
     7.1     7.2     7.3     7.4     8.1     8.2     8.3     8.4
     9.1     9.2     9.3     9.4    10.1    10.2    10.3    10.4
    11.1    11.2    11.3    11.4    12.1    12.2    12.3    12.4
    13.1    13.2    13.3    13.4    14.1    14.2    14.3    14.4
    15.1    15.2    15.3    15.4    16.1    16.2    16.3    16.4
    17.1    17.2    17.3    17.4    18.1    18.2    18.3    18.4
    19.1    19.2    19.3    19.4    20.1    20.2    20.3    20.4
    21.1    21.2    21.3    21.4    22.1    22.2    22.3    22.4
    23.1    23.2    23.3    23.4    24.1    24.2    24.3    24.4
    25.1    25.2    25.3    25.4    26.1    26.2    26.3    26.4
    27.1    27.2    27.3    27.4    28.1    28.2    28.3    28.4
    29.1    29.2    29.3    29.4    30.1    30.2    30.3    30.4
    31.1    31.2    31.3    31.4    32.1    32.2    32.3    32.4
    33.1    33.2    33.3    33.4    34.1    34.2    34.3    34.4
    35.1    35.2    35.3    35.4    36.1    36.2    36.3    36.4
    37.1    37.2    37.3    37.4    38.1    38.2    38.3    38.4
    39.1    39.2    39.3    39.4    40.1    40.2    40.3    40.4
nstep=       5000

  Plastic element no [element no.Gauss point no] =
     1.1     1.2     1.3     1.4     2.1     2.2     2.3     2.4
     3.1     3.2     3.3     3.4     4.1     4.2     4.3     4.4
     5.1     5.2     5.3     5.4     6.1     6.2     6.3     6.4
     7.1     7.2     7.3     7.4     8.1     8.2     8.3     8.4
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     9.1     9.2     9.3     9.4    10.1    10.2    10.3    10.4
    11.1    11.2    11.3    11.4    12.1    12.2    12.3    12.4
    13.1    13.2    13.3    13.4    14.1    14.2    14.3    14.4
    15.1    15.2    15.3    15.4    16.1    16.2    16.3    16.4
    17.1    17.2    17.3    17.4    18.1    18.2    18.3    18.4
    19.1    19.2    19.3    19.4    20.1    20.2    20.3    20.4
    21.1    21.2    21.3    21.4    22.1    22.2    22.3    22.4
    23.1    23.2    23.3    23.4    24.1    24.2    24.3    24.4
    25.1    25.2    25.3    25.4    26.1    26.2    26.3    26.4
    27.1    27.2    27.3    27.4    28.1    28.2    28.3    28.4
    29.1    29.2    29.3    29.4    30.1    30.2    30.3    30.4
    31.1    31.2    31.3    31.4    32.1    32.2    32.3    32.4
    33.1    33.2    33.3    33.4    34.1    34.2    34.3    34.4
    35.1    35.2    35.3    35.4    36.1    36.2    36.3    36.4
    37.1    37.2    37.3    37.4    38.1    38.2    38.3    38.4
    39.1    39.2    39.3    39.4    40.1    40.2    40.3    40.4
nstep=       6000

  Plastic element no [element no.Gauss point no] =
     1.1     1.2     1.3     1.4     2.1     2.2     2.3     2.4
     3.1     3.2     3.3     3.4     4.1     4.2     4.3     4.4
     5.1     5.2     5.3     5.4     6.1     6.2     6.3     6.4
     7.1     7.2     7.3     7.4     8.1     8.2     8.3     8.4
     9.1     9.2     9.3     9.4    10.1    10.2    10.3    10.4
    11.1    11.2    11.3    11.4    12.1    12.2    12.3    12.4
    13.1    13.2    13.3    13.4    14.1    14.2    14.3    14.4
    15.1    15.2    15.3    15.4    16.1    16.2    16.3    16.4
    17.1    17.2    17.3    17.4    18.1    18.2    18.3    18.4
    19.1    19.2    19.3    19.4    20.1    20.2    20.3    20.4
    21.1    21.2    21.3    21.4    22.1    22.2    22.3    22.4
    23.1    23.2    23.3    23.4    24.1    24.2    24.3    24.4
    25.1    25.2    25.3    25.4    26.1    26.2    26.3    26.4
    27.1    27.2    27.3    27.4    28.1    28.2    28.3    28.4
    29.1    29.2    29.3    29.4    30.1    30.2    30.3    30.4
    31.1    31.2    31.3    31.4    32.1    32.2    32.3    32.4
    33.1    33.2    33.3    33.4    34.1    34.2    34.3    34.4
    35.1    35.2    35.3    35.4    36.1    36.2    36.3    36.4
    37.1    37.2    37.3    37.4    38.1    38.2    38.3    38.4
nstep=       7000

  Plastic element no [element no.Gauss point no] =
     1.1     1.2     1.3     1.4     2.1     2.2     2.3     2.4
     3.1     3.2     3.3     3.4     4.1     4.2     4.3     4.4
     5.1     5.2     5.3     5.4     6.1     6.2     6.3     6.4
     7.1     7.2     7.3     7.4     8.1     8.2     8.3     8.4
     9.1     9.2     9.3     9.4    10.1    10.2    10.3    10.4
    11.1    11.2    11.3    11.4    12.1    12.2    12.3    12.4
    13.1    13.2    13.3    13.4    14.1    14.2    14.3    14.4
    15.1    15.2    15.3    15.4    16.1    16.2    16.3    16.4
    17.1    17.2    17.3    17.4    18.1    18.2    18.3    18.4
    19.1    19.2    19.3    19.4    20.1    20.2    20.3    20.4
    21.1    21.2    21.3    21.4    22.1    22.2    22.3    22.4
    23.1    23.2    23.3    23.4    24.1    24.2    24.3    24.4
    25.1    25.2    25.3    25.4    26.1    26.2    26.3    26.4
    27.1    27.2    27.3    27.4    28.1    28.2    28.3    28.4
    29.1    29.2    29.3    29.4    30.1    30.2    30.3    30.4
    31.1    31.2    31.3    31.4    32.1    32.2    32.3    32.4
    33.1    33.2    33.3    33.4    34.1    34.2    34.3    34.4
    35.1    35.2    35.3    35.4    36.1    36.2    36.3    36.4
    37.1    37.2    37.3    37.4    38.1    38.2    38.3    38.4
```

```
   39.1    39.2    39.3    39.4    40.1    40.2    40.3    40.4
   nstep=       8000

 Plastic element no [element no.Gauss point no] =
    1.1     1.2     1.3     1.4     2.1     2.2     2.3     2.4
    3.1     3.2     3.3     3.4     4.1     4.2     4.3     4.4
    5.1     5.2     5.3     5.4     6.1     6.2     6.3     6.4
    7.1     7.2     7.3     7.4     8.1     8.2     8.3     8.4
    9.1     9.2     9.3     9.4    10.1    10.2    10.3    10.4
   11.1    11.2    11.3    11.4    12.1    12.2    12.3    12.4
   13.1    13.2    13.3    13.4    14.1    14.2    14.3    14.4
   15.1    15.2    15.3    15.4    16.1    16.2    16.3    16.4
   17.1    17.2    17.3    17.4    18.1    18.2    18.3    18.4
   19.1    19.2    19.3    19.4    20.1    20.2    20.3    20.4
   21.1    21.2    21.3    21.4    22.1    22.2    22.3    22.4
   23.1    23.2    23.3    23.4    24.1    24.2    24.3    24.4
   25.1    25.2    25.3    25.4    26.1    26.2    26.3    26.4
   27.1    27.2    27.3    27.4    28.1    28.2    28.3    28.4
   29.1    29.2    29.3    29.4    30.1    30.2    30.3    30.4
   31.1    31.2    31.3    31.4    32.1    32.2    32.3    32.4
   33.1    33.2    33.3    33.4    34.1    34.2    34.3    34.4
   35.1    35.2    35.3    35.4    36.1    36.2    36.3    36.4
   37.1    37.2    37.3    37.4    38.1    38.2    38.3    38.4
   39.1    39.2    39.3    39.4    40.1    40.2    40.3    40.4

nstep=       9000

 Plastic element no [element no.Gauss point no] =
    1.1     1.2     1.3     1.4     2.1     2.2     2.3     2.4
    3.1     3.2     3.3     3.4     4.1     4.2     4.3     4.4
    5.1     5.2     5.3     5.4     6.1     6.2     6.3     6.4
    7.1     7.2     7.3     7.4     8.1     8.2     8.3     8.4
    9.1     9.2     9.3     9.4    10.1    10.2    10.3    10.4
   11.1    11.2    11.3    11.4    12.1    12.2    12.3    12.4
   13.1    13.2    13.3    13.4    14.1    14.2    14.3    14.4
   15.1    15.2    15.3    15.4    16.1    16.2    16.3    16.4
   17.1    17.2    17.3    17.4    18.1    18.2    18.3    18.4
   19.1    19.2    19.3    19.4    20.1    20.2    20.3    20.4
   21.1    21.2    21.3    21.4    22.1    22.2    22.3    22.4
   23.1    23.2    23.3    23.4    24.1    24.2    24.3    24.4
   25.1    25.2    25.3    25.4    26.1    26.2    26.3    26.4
   27.1    27.2    27.3    27.4    28.1    28.2    28.3    28.4
   29.1    29.2    29.3    29.4    30.1    30.2    30.3    30.4
   31.1    31.2    31.3    31.4    32.1    32.2    32.3    32.4
   33.1    33.2    33.3    33.4    34.1    34.2    34.3    34.4
   35.1    35.2    35.3    35.4    36.1    36.2    36.3    36.4
   37.1    37.2    37.3    37.4    38.1    38.2    38.3    38.4
   39.1    39.2    39.3    39.4    40.1    40.2    40.3    40.4

nstep=      10000

 Plastic element no [element no.Gauss point no] =
    1.1     1.2     1.3     1.4     2.1     2.2     2.3     2.4
    3.1     3.2     3.3     3.4     4.1     4.2     4.3     4.4
    5.1     5.2     5.3     5.4     6.1     6.2     6.3     6.4
    7.1     7.2     7.3     7.4     8.1     8.2     8.3     8.4
    9.1     9.2     9.3     9.4    10.1    10.2    10.3    10.4
   11.1    11.2    11.3    11.4    12.1    12.2    12.3    12.4
   13.1    13.2    13.3    13.4    14.1    14.2    14.3    14.4
   15.1    15.2    15.3    15.4    16.1    16.2    16.3    16.4
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   17.1    17.2    17.3    17.4    18.1    18.2    18.3    18.4
   19.1    19.2    19.3    19.4    20.1    20.2    20.3    20.4
   21.1    21.2    21.3    21.4    22.1    22.2    22.3    22.4
   23.1    23.2    23.3    23.4    24.1    24.2    24.3    24.4
   25.1    25.2    25.3    25.4    26.1    26.2    26.3    26.4
   27.1    27.2    27.3    27.4    28.1    28.2    28.3    28.4
   29.1    29.2    29.3    29.4    30.1    30.2    30.3    30.4
   31.1    31.2    31.3    31.4    32.1    32.2    32.3    32.4
   33.1    33.2    33.3    33.4    34.1    34.2    34.3    34.4
   35.1    35.2    35.3    35.4    36.1    36.2    36.3    36.4
   37.1    37.2    37.3    37.4    38.1    38.2    38.3    38.4
   39.1    39.2    39.3    39.4    40.1    40.2    40.3    40.4

nstep=      11000

 Plastic element no [element no.Gauss point no] =
    1.1     1.2     1.3     1.4     2.1     2.2     2.3     2.4
    3.1     3.2     3.3     3.4     4.1     4.2     4.3     4.4
    5.1     5.2     5.3     5.4     6.1     6.2     6.3     6.4
    7.1     7.2     7.3     7.4     8.1     8.2     8.3     8.4
    9.1     9.2     9.3     9.4    10.1    10.2    10.3    10.4
   11.1    11.2    11.3    11.4    12.1    12.2    12.3    12.4
   13.1    13.2    13.3    13.4    14.1    14.2    14.3    14.4
   15.1    15.2    15.3    15.4    16.1    16.2    16.3    16.4
   17.1    17.2    17.3    17.4    18.1    18.2    18.3    18.4
   19.1    19.2    19.3    19.4    20.1    20.2    20.3    20.4
   21.1    21.2    21.3    21.4    22.1    22.2    22.3    22.4
   23.1    23.2    23.3    23.4    24.1    24.2    24.3    24.4
   25.1    25.2    25.3    25.4    26.1    26.2    26.3    26.4
   27.1    27.2    27.3    27.4    28.1    28.2    28.3    28.4
   29.1    29.2    29.3    29.4    30.1    30.2    30.3    30.4
   31.1    31.2    31.3    31.4    32.1    32.2    32.3    32.4
   33.1    33.2    33.3    33.4    34.1    34.2    34.3    34.4
   35.1    35.2    35.3    35.4    36.1    36.2    36.3    36.4
   37.1    37.2    37.3    37.4    38.1    38.2    38.3    38.4
   39.1    39.2    39.3    39.4    40.1    40.2    40.3    40.4
nstep=      11100

 Plastic element no [element no.Gauss point no] =
    1.1     1.2     1.3     1.4     2.1     2.2     2.3     2.4
    3.1     3.2     3.3     3.4     4.1     4.2     4.3     4.4
    5.1     5.2     5.3     5.4     6.1     6.2     6.3     6.4
    7.1     7.2     7.3     7.4     8.1     8.2     8.3     8.4
    9.1     9.2     9.3     9.4    10.1    10.2    10.3    10.4
   11.1    11.2    11.3    11.4    12.1    12.2    12.3    12.4
   13.1    13.2    13.3    13.4    14.1    14.2    14.3    14.4
   15.1    15.2    15.3    15.4    16.1    16.2    16.3    16.4
   17.1    17.2    17.3    17.4    18.1    18.2    18.3    18.4
   19.1    19.2    19.3    19.4    20.1    20.2    20.3    20.4
   21.1    21.2    21.3    21.4    22.1    22.2    22.3    22.4
   23.1    23.2    23.3    23.4    24.1    24.2    24.3    24.4
   25.1    25.2    25.3    25.4    26.1    26.2    26.3    26.4
   27.1    27.2    27.3    27.4    28.1    28.2    28.3    28.4
   29.1    29.2    29.3    29.4    30.1    30.2    30.3    30.4
   31.1    31.2    31.3    31.4    32.1    32.2    32.3    32.4
   33.1    33.2    33.3    33.4    34.1    34.2    34.3    34.4
   35.1    35.2    35.3    35.4    36.1    36.2    36.3    36.4
   37.1    37.2    37.3    37.4    38.1    38.2    38.3    38.4
   39.1    39.2    39.3    39.4    40.1    40.2    40.3    40.4
nstep=      11200
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 Plastic element no [element no.Gauss point no] =
    1.1     1.2     1.3     1.4     2.1     2.2     2.3     2.4
    3.1     3.2     3.3     3.4     4.1     4.2     4.3     4.4
    5.1     5.2     5.3     5.4     6.1     6.2     6.3     6.4
    7.1     7.2     7.3     7.4     8.1     8.2     8.3     8.4
    9.1     9.2     9.3     9.4    10.1    10.2    10.3    10.4
   11.1    11.2    11.3    11.4    12.1    12.2    12.3    12.4
   13.1    13.2    13.3    13.4    14.1    14.2    14.3    14.4
   15.1    15.2    15.3    15.4    16.1    16.2    16.3    16.4
   17.1    17.2    17.3    17.4    18.1    18.2    18.3    18.4
   19.1    19.2    19.3    19.4    20.1    20.2    20.3    20.4
   21.1    21.2    21.3    21.4    22.1    22.2    22.3    22.4
   23.1    23.2    23.3    23.4    24.1    24.2    24.3    24.4
   25.1    25.2    25.3    25.4    26.1    26.2    26.3    26.4
   27.1    27.2    27.3    27.4    28.1    28.2    28.3    28.4
   29.1    29.2    29.3    29.4    30.1    30.2    30.3    30.4
   31.1    31.2    31.3    31.4    32.1    32.2    32.3    32.4
   33.1    33.2    33.3    33.4    34.1    34.2    34.3    34.4
   35.1    35.2    35.3    35.4    36.1    36.2    36.3    36.4
   37.1    37.2    37.3    37.4    38.1    38.2    38.3    38.4
   39.1    39.2    39.3    39.4    40.1    40.2    40.3    40.4
nstep=      11300

 Plastic element no [element no.Gauss point no] =
    1.1     1.2     1.3     1.4     2.1     2.2     2.3     2.4
    3.1     3.2     3.3     3.4     4.1     4.2     4.3     4.4
    5.1     5.2     5.3     5.4     6.1     6.2     6.3     6.4
    7.1     7.2     7.3     7.4     8.1     8.2     8.3     8.4
    9.1     9.2     9.3     9.4    10.1    10.2    10.3    10.4
   11.1    11.2    11.3    11.4    12.1    12.2    12.3    12.4
   13.1    13.2    13.3    13.4    14.1    14.2    14.3    14.4
   15.1    15.2    15.3    15.4    16.1    16.2    16.3    16.4
   17.1    17.2    17.3    17.4    18.1    18.2    18.3    18.4
   19.1    19.2    19.3    19.4    20.1    20.2    20.3    20.4
   21.1    21.2    21.3    21.4    22.1    22.2    22.3    22.4
   23.1    23.2    23.3    23.4    24.1    24.2    24.3    24.4
   25.1    25.2    25.3    25.4    26.1    26.2    26.3    26.4
   27.1    27.2    27.3    27.4    28.1    28.2    28.3    28.4
   29.1    29.2    29.3    29.4    30.1    30.2    30.3    30.4
   31.1    31.2    31.3    31.4    32.1    32.2    32.3    32.4
   33.1    33.2    33.3    33.4    34.1    34.2    34.3    34.4
   35.1    35.2    35.3    35.4    36.1    36.2    36.3    36.4
   37.1    37.2    37.3    37.4    38.1    38.2    38.3    38.4
   39.1    39.2    39.3    39.4    40.1    40.2    40.3    40.4
nstep=      11400

 Plastic element no [element no.Gauss point no] =
    1.1     1.2     1.3     1.4     2.1     2.2     2.3     2.4
    3.1     3.2     3.3     3.4     4.1     4.2     4.3     4.4
    5.1     5.2     5.3     5.4     6.1     6.2     6.3     6.4
    7.1     7.2     7.3     7.4     8.1     8.2     8.3     8.4
    9.1     9.2     9.3     9.4    10.1    10.2    10.3    10.4
   11.1    11.2    11.3    11.4    12.1    12.2    12.3    12.4
   13.1    13.2    13.3    13.4    14.1    14.2    14.3    14.4
   15.1    15.2    15.3    15.4    16.1    16.2    16.3    16.4
   17.1    17.2    17.3    17.4    18.1    18.2    18.3    18.4
   19.1    19.2    19.3    19.4    20.1    20.2    20.3    20.4
   21.1    21.2    21.3    21.4    22.1    22.2    22.3    22.4
   23.1    23.2    23.3    23.4    24.1    24.2    24.3    24.4
```

```
   25.1    25.2    25.3    25.4    26.1    26.2    26.3    26.4
   27.1    27.2    27.3    27.4    28.1    28.2    28.3    28.4
   29.1    29.2    29.3    29.4    30.1    30.2    30.3    30.4
   31.1    31.2    31.3    31.4    32.1    32.2    32.3    32.4
   33.1    33.2    33.3    33.4    34.1    34.2    34.3    34.4
   35.1    35.2    35.3    35.4    36.1    36.2    36.3    36.4
   37.1    37.2    37.3    37.4    38.1    38.2    38.3    38.4
   39.1    39.2    39.3    39.4    40.1    40.2    40.3    40.4
nstep=      11500

 Plastic element no [element no.Gauss point no] =
    1.1     1.2     1.3     1.4     2.1     2.2     2.3     2.4
    3.1     3.2     3.3     3.4     4.1     4.2     4.3     4.4
    5.1     5.2     5.3     5.4     6.1     6.2     6.3     6.4
    7.1     7.2     7.3     7.4     8.1     8.2     8.3     8.4
    9.1     9.2     9.3     9.4    10.1    10.2    10.3    10.4
   11.1    11.2    11.3    11.4    12.1    12.2    12.3    12.4
   13.1    13.2    13.3    13.4    14.1    14.2    14.3    14.4
   15.1    15.2    15.3    15.4    16.1    16.2    16.3    16.4
   17.1    17.2    17.3    17.4    18.1    18.2    18.3    18.4
   19.1    19.2    19.3    19.4    20.1    20.2    20.3    20.4
   21.1    21.2    21.3    21.4    22.1    22.2    22.3    22.4
   23.1    23.2    23.3    23.4    24.1    24.2    24.3    24.4
   25.1    25.2    25.3    25.4    26.1    26.2    26.3    26.4
   27.1    27.2    27.3    27.4    28.1    28.2    28.3    28.4
   29.1    29.2    29.3    29.4    30.1    30.2    30.3    30.4
   31.1    31.2    31.3    31.4    32.1    32.2    32.3    32.4
   33.1    33.2    33.3    33.4    34.1    34.2    34.3    34.4
   35.1    35.2    35.3    35.4    36.1    36.2    36.3    36.4
   37.1    37.2    37.3    37.4    38.1    38.2    38.3    38.4
   39.1    39.2    39.3    39.4    40.1    40.2    40.3    40.4
nstep=      11600

 Plastic element no [element no.Gauss point no] =
    1.1     1.2     1.3     1.4     2.1     2.2     2.3     2.4
    3.1     3.2     3.3     3.4     4.1     4.2     4.3     4.4
    5.1     5.2     5.3     5.4     6.1     6.2     6.3     6.4
    7.1     7.2     7.3     7.4     8.1     8.2     8.3     8.4
    9.1     9.2     9.3     9.4    10.1    10.2    10.3    10.4
   11.1    11.2    11.3    11.4    12.1    12.2    12.3    12.4
   13.1    13.2    13.3    13.4    14.1    14.2    14.3    14.4
   15.1    15.2    15.3    15.4    16.1    16.2    16.3    16.4
   17.1    17.2    17.3    17.4    18.1    18.2    18.3    18.4
   19.1    19.2    19.3    19.4    20.1    20.2    20.3    20.4
   21.1    21.2    21.3    21.4    22.1    22.2    22.3    22.4
   23.1    23.2    23.3    23.4    24.1    24.2    24.3    24.4
   25.1    25.2    25.3    25.4    26.1    26.2    26.3    26.4
   27.1    27.2    27.3    27.4    28.1    28.2    28.3    28.4
   29.1    29.2    29.3    29.4    30.1    30.2    30.3    30.4
   31.1    31.2    31.3    31.4    32.1    32.2    32.3    32.4
   33.1    33.2    33.3    33.4    34.1    34.2    34.3    34.4
   35.1    35.2    35.3    35.4    36.1    36.2    36.3    36.4
   37.1    37.2    37.3    37.4    38.1    38.2    38.3    38.4
   39.1    39.2    39.3    39.4    40.1    40.2    40.3    40.4
nstep=      11700

 Plastic element no [element no.Gauss point no] =
    1.1     1.2     1.3     1.4     2.1     2.2     2.3     2.4
    3.1     3.2     3.3     3.4     4.1     4.2     4.3     4.4
    5.1     5.2     5.3     5.4     6.1     6.2     6.3     6.4
```

7.1	7.2	7.3	7.4	8.1	8.2	8.3	8.4
9.1	9.2	9.3	9.4	10.1	10.2	10.3	10.4
11.1	11.2	11.3	11.4	12.1	12.2	12.3	12.4
13.1	13.2	13.3	13.4	14.1	14.2	14.3	14.4
15.1	15.2	15.3	15.4	16.1	16.2	16.3	16.4
17.1	17.2	17.3	17.4	18.1	18.2	18.3	18.4
19.1	19.2	19.3	19.4	20.1	20.2	20.3	20.4
21.1	21.2	21.3	21.4	22.1	22.2	22.3	22.4
23.1	23.2	23.3	23.4	24.1	24.2	24.3	24.4
25.1	25.2	25.3	25.4	26.1	26.2	26.3	26.4
27.1	27.2	27.3	27.4	28.1	28.2	28.3	28.4
29.1	29.2	29.3	29.4	30.1	30.2	30.3	30.4
31.1	31.2	31.3	31.4	32.1	32.2	32.3	32.4
33.1	33.2	33.3	33.4	34.1	34.2	34.3	34.4
35.1	35.2	35.3	35.4	36.1	36.2	36.3	36.4
37.1	37.2	37.3	37.4	38.1	38.2	38.3	38.4
39.1	39.2	39.3	39.4	40.1	40.2	40.3	40.4

nstep= 11800

Plastic element no [element no.Gauss point no] =

1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4
3.1	3.2	3.3	3.4	4.1	4.2	4.3	4.4
5.1	5.2	5.3	5.4	6.1	6.2	6.3	6.4
7.1	7.2	7.3	7.4	8.1	8.2	8.3	8.4
9.1	9.2	9.3	9.4	10.1	10.2	10.3	10.4
11.1	11.2	11.3	11.4	12.1	12.2	12.3	12.4
13.1	13.2	13.3	13.4	14.1	14.2	14.3	14.4
15.1	15.2	15.3	15.4	16.1	16.2	16.3	16.4
17.1	17.2	17.3	17.4	18.1	18.2	18.3	18.4
19.1	19.2	19.3	19.4	20.1	20.2	20.3	20.4
21.1	21.2	21.3	21.4	22.1	22.2	22.3	22.4
23.1	23.2	23.3	23.4	24.1	24.2	24.3	24.4
25.1	25.2	25.3	25.4	26.1	26.2	26.3	26.4
27.1	27.2	27.3	27.4	28.1	28.2	28.3	28.4
29.1	29.2	29.3	29.4	30.1	30.2	30.3	30.4
31.1	31.2	31.3	31.4	32.1	32.2	32.3	32.4
33.1	33.2	33.3	33.4	34.1	34.2	34.3	34.4
35.1	35.2	35.3	35.4	36.1	36.2	36.3	36.4
37.1	37.2	37.3	37.4	38.1	38.2	38.3	38.4
39.1	39.2	39.3	39.4	40.1	40.2	40.3	40.4

card 21 stress output information card

	seq.	node#	d-(0),v-(1),a-(2),sig-(3)	x(1),y(2),xy(3)
	1	40	0	2
	2	41	0	2
	3	42	0	2

time =	.10000E-01	-.668E-04	-.325E-03	-.668E-04
time =	.20000E-01	-.294E-03	-.209E-02	-.294E-03
time =	.30000E-01	-.557E-03	-.531E-02	-.557E-03
time =	.40000E-01	-.832E-03	-.976E-02	-.832E-03
time =	.50000E-01	-.113E-02	-.152E-01	-.113E-02
time =	.60000E-01	-.148E-02	-.212E-01	-.148E-02
time =	.70000E-01	-.189E-02	-.277E-01	-.189E-02
time =	.80000E-01	-.237E-02	-.342E-01	-.237E-02
time =	.90000E-01	-.293E-02	-.406E-01	-.293E-02
time =	.10000E+00	-.356E-02	-.465E-01	-.356E-02
time =	.11000E+00	-.426E-02	-.516E-01	-.426E-02
time =	.12000E+00	-.502E-02	-.559E-01	-.502E-02
time =	.13000E+00	-.582E-02	-.590E-01	-.582E-02
time =	.14000E+00	-.664E-02	-.609E-01	-.664E-02
time =	.15000E+00	-.744E-02	-.614E-01	-.744E-02
time =	.16000E+00	-.820E-02	-.604E-01	-.820E-02
time =	.17000E+00	-.889E-02	-.580E-01	-.889E-02
time =	.18000E+00	-.947E-02	-.542E-01	-.947E-02
time =	.19000E+00	-.991E-02	-.491E-01	-.991E-02
time =	.20000E+00	-.102E-01	-.429E-01	-.102E-01
time =	.21000E+00	-.103E-01	-.356E-01	-.103E-01
time =	.22000E+00	-.102E-01	-.276E-01	-.102E-01
time =	.23000E+00	-.988E-02	-.191E-01	-.988E-02
time =	.24000E+00	-.938E-02	-.103E-01	-.938E-02
time =	.25000E+00	-.871E-02	-.154E-02	-.871E-02
time =	.26000E+00	-.788E-02	.699E-02	-.788E-02
time =	.27000E+00	-.692E-02	.150E-01	-.692E-02
time =	.28000E+00	-.587E-02	.223E-01	-.587E-02
time =	.29000E+00	-.477E-02	.286E-01	-.477E-02
time =	.30000E+00	-.364E-02	.338E-01	-.364E-02
time =	.31000E+00	-.253E-02	.377E-01	-.253E-02
time =	.32000E+00	-.147E-02	.403E-01	-.147E-02
time =	.33000E+00	-.482E-03	.414E-01	-.482E-03
time =	.34000E+00	.404E-03	.411E-01	.404E-03
time =	.35000E+00	.117E-02	.393E-01	.117E-02
time =	.36000E+00	.181E-02	.362E-01	.181E-02
time =	.37000E+00	.230E-02	.319E-01	.230E-02
time =	.38000E+00	.265E-02	.264E-01	.265E-02
time =	.39000E+00	.286E-02	.199E-01	.286E-02
time =	.40000E+00	.292E-02	.127E-01	.292E-02
time =	.41000E+00	.284E-02	.487E-02	.284E-02
time =	.42000E+00	.263E-02	-.322E-02	.263E-02
time =	.43000E+00	.228E-02	-.114E-01	.228E-02
time =	.44000E+00	.182E-02	-.194E-01	.182E-02
time =	.45000E+00	.124E-02	-.269E-01	.124E-02
time =	.46000E+00	.561E-03	-.337E-01	.561E-03
time =	.47000E+00	-.207E-03	-.397E-01	-.207E-03
time =	.48000E+00	-.104E-02	-.446E-01	-.104E-02
time =	.49000E+00	-.193E-02	-.482E-01	-.193E-02
time =	.50000E+00	-.283E-02	-.504E-01	-.283E-02
time =	.51000E+00	-.372E-02	-.512E-01	-.372E-02
time =	.52000E+00	-.456E-02	-.504E-01	-.456E-02
time =	.53000E+00	-.532E-02	-.482E-01	-.532E-02
time =	.54000E+00	-.597E-02	-.445E-01	-.597E-02

time =	.55000E+00	-.647E-02	-.396E-01	-.647E-02
time =	.56000E+00	-.680E-02	-.335E-01	-.680E-02
time =	.57000E+00	-.694E-02	-.264E-01	-.694E-02
time =	.58000E+00	-.688E-02	-.187E-01	-.688E-02
time =	.59000E+00	-.663E-02	-.104E-01	-.663E-02
time =	.60000E+00	-.618E-02	-.195E-02	-.618E-02
time =	.61000E+00	-.556E-02	.645E-02	-.556E-02
time =	.62000E+00	-.480E-02	.145E-01	-.480E-02
time =	.63000E+00	-.391E-02	.221E-01	-.391E-02
time =	.64000E+00	-.294E-02	.288E-01	-.294E-02
time =	.65000E+00	-.192E-02	.346E-01	-.192E-02
time =	.66000E+00	-.887E-03	.392E-01	-.887E-03
time =	.67000E+00	.122E-03	.425E-01	.122E-03
time =	.68000E+00	.108E-02	.444E-01	.108E-02
time =	.69000E+00	.195E-02	.450E-01	.195E-02
time =	.70000E+00	.272E-02	.440E-01	.272E-02
time =	.71000E+00	.337E-02	.417E-01	.337E-02
time =	.72000E+00	.389E-02	.381E-01	.389E-02
time =	.73000E+00	.427E-02	.332E-01	.427E-02
time =	.74000E+00	.450E-02	.273E-01	.450E-02
time =	.75000E+00	.460E-02	.205E-01	.460E-02
time =	.76000E+00	.455E-02	.129E-01	.455E-02
time =	.77000E+00	.438E-02	.492E-02	.438E-02
time =	.78000E+00	.406E-02	-.331E-02	.406E-02
time =	.79000E+00	.363E-02	-.115E-01	.363E-02
time =	.80000E+00	.308E-02	-.195E-01	.308E-02
time =	.81000E+00	.242E-02	-.269E-01	.242E-02
time =	.82000E+00	.166E-02	-.336E-01	.166E-02
time =	.83000E+00	.825E-03	-.393E-01	.825E-03
time =	.84000E+00	-.716E-04	-.439E-01	-.716E-04
time =	.85000E+00	-.100E-02	-.472E-01	-.100E-02
time =	.86000E+00	-.194E-02	-.490E-01	-.194E-02
time =	.87000E+00	-.286E-02	-.494E-01	-.286E-02
time =	.88000E+00	-.372E-02	-.483E-01	-.372E-02
time =	.89000E+00	-.448E-02	-.457E-01	-.448E-02
time =	.90000E+00	-.512E-02	-.417E-01	-.512E-02
time =	.91000E+00	-.561E-02	-.364E-01	-.561E-02
time =	.92000E+00	-.591E-02	-.301E-01	-.591E-02
time =	.93000E+00	-.602E-02	-.228E-01	-.602E-02
time =	.94000E+00	-.594E-02	-.149E-01	-.594E-02
time =	.95000E+00	-.565E-02	-.662E-02	-.565E-02
time =	.96000E+00	-.518E-02	.180E-02	-.518E-02
time =	.97000E+00	-.454E-02	.101E-01	-.454E-02
time =	.98000E+00	-.376E-02	.180E-01	-.376E-02
time =	.99000E+00	-.287E-02	.253E-01	-.287E-02
time =	.10000E+01	-.191E-02	.317E-01	-.191E-02
time =	.10100E+01	-.903E-03	.371E-01	-.903E-03
time =	.10200E+01	.101E-03	.413E-01	.101E-03
time =	.10300E+01	.107E-02	.442E-01	.107E-02
time =	.10400E+01	.198E-02	.456E-01	.198E-02
time =	.10500E+01	.281E-02	.457E-01	.281E-02
time =	.10600E+01	.352E-02	.443E-01	.352E-02
time =	.10700E+01	.411E-02	.416E-01	.411E-02
time =	.10800E+01	.457E-02	.375E-01	.457E-02
time =	.10900E+01	.489E-02	.323E-01	.489E-02
time =	.11000E+01	.506E-02	.261E-01	.506E-02
time =	.11100E+01	.510E-02	.190E-01	.510E-02
time =	.11200E+01	.500E-02	.113E-01	.500E-02
time =	.11300E+01	.476E-02	.313E-02	.476E-02
time =	.11400E+01	.440E-02	-.515E-02	.440E-02

```
time =   .11500E+01   .391E-02 -.133E-01   .391E-02
time =   .11600E+01   .331E-02 -.212E-01   .331E-02
time =   .11700E+01   .261E-02 -.284E-01   .261E-02
time =   .11800E+01   .181E-02 -.349E-01   .181E-02
```

Problem 4.

A rectangular plate of elastic-plastic material with Mises criterion subjected to pulse loadings

- **Problem description and loading functions**
- **Deflection and stress plots**
- **Input file for Soild2D**
- **Sample output of Soild2D**

Problem description and loading functions

2D Straight Edge Boundary with impulsive force (J2 material)

Input:

1. Geometry and finite element mesh are the same as in the case of sinusoidal.

2. Material Properites are shown as the followings:

E	=	9000 psi
υ	=	0.3
ρ	=	4.67e-2 lb-sec^2/in^4
Ft	=	40 psi (tensile strength)
Et	=	500 psi
plate tickness	=	0.4

Assumed kinematic work-hardening J2 material on plane stress case.

3. Impulsive load function is are shown in the next following page.

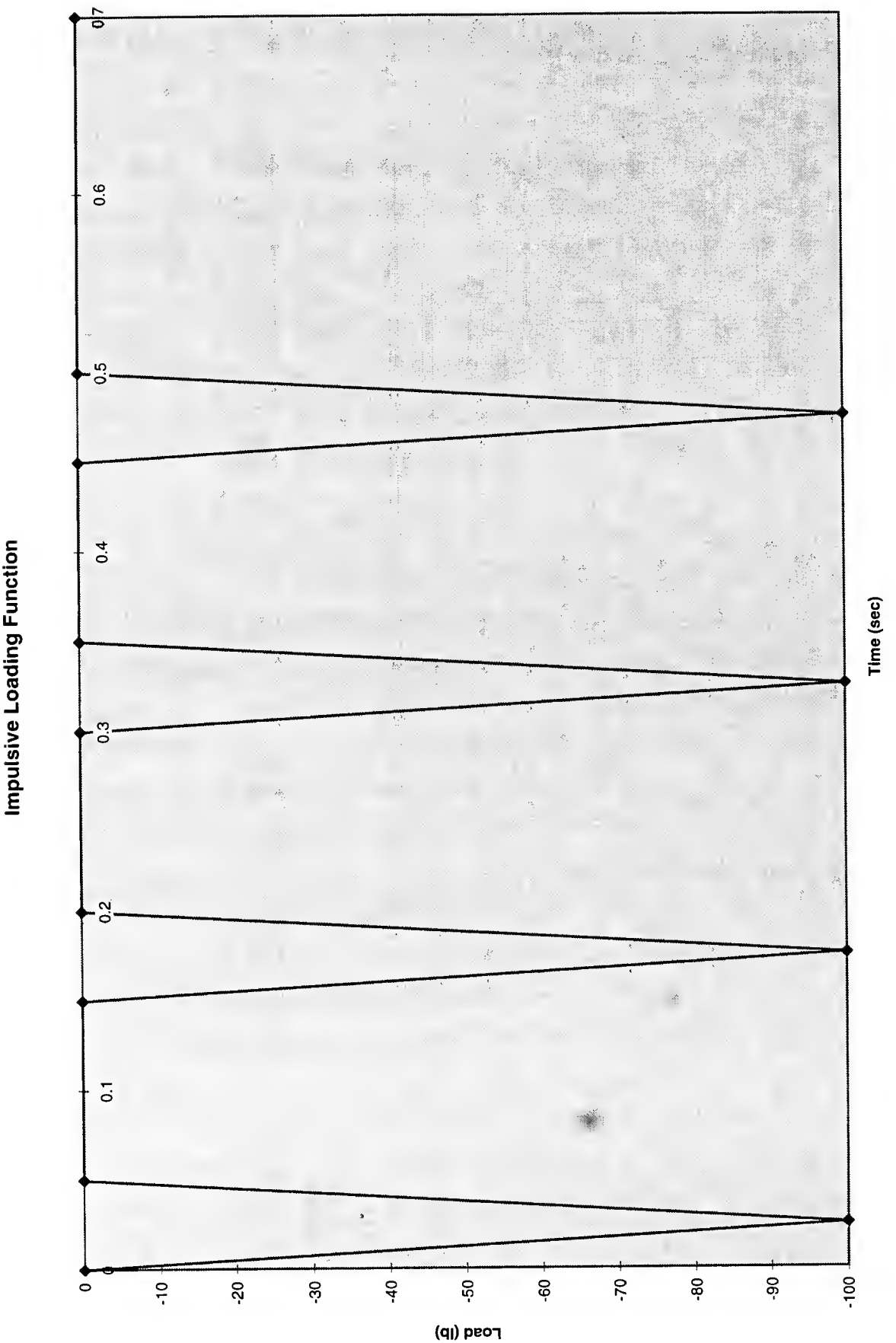
4. The input data file and output result are shown after load function.

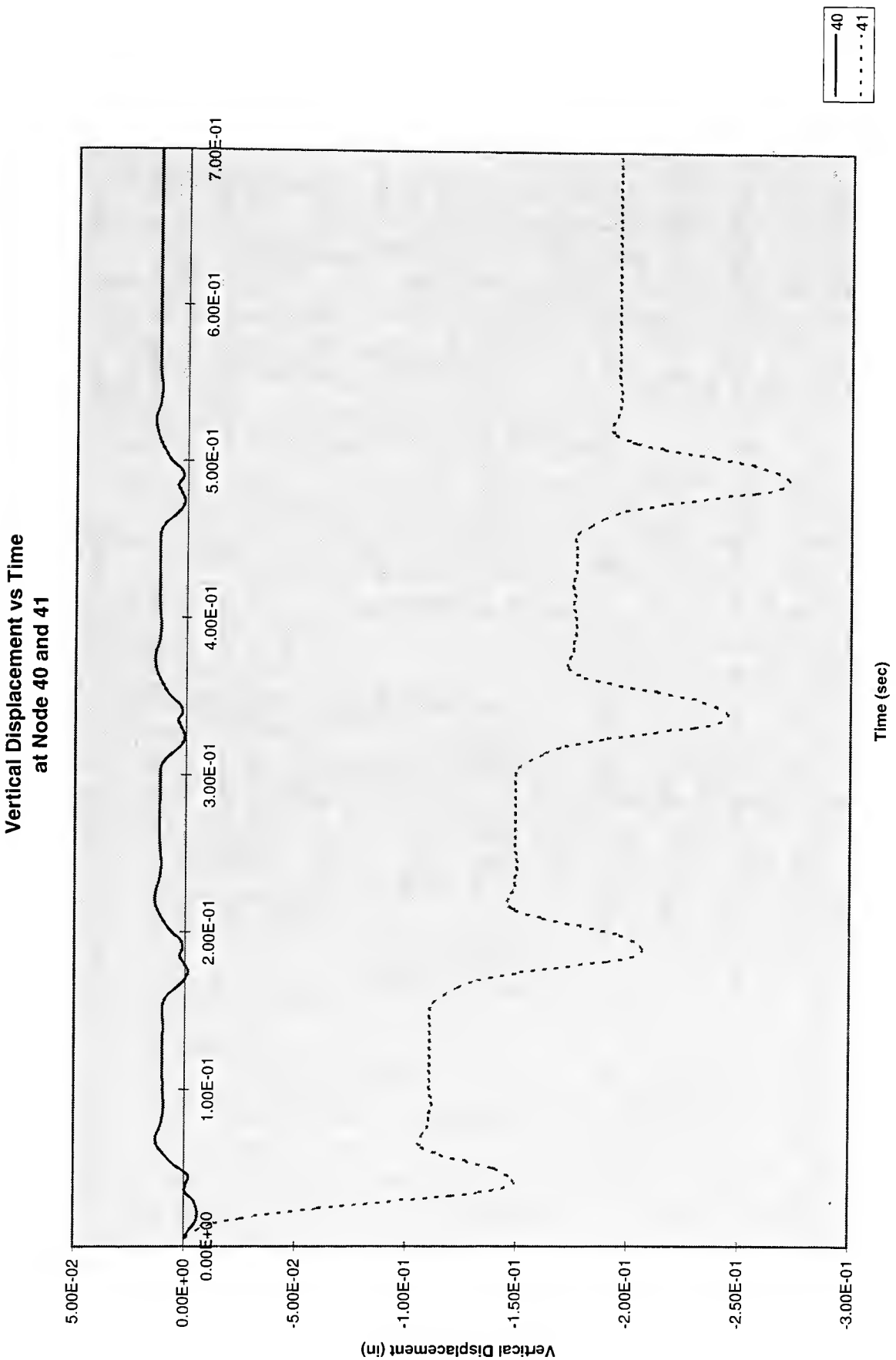
Problem results

The vertical settlements are plotted against time.

\

Deflection and stress plots


Impulsive Loading Function
Load (lb)
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
Time (sec)


Vertical Displacement vs Time
at Node 40 and 41
Vertical Displacement (in)
Time (sec)
5.00E-02
0.00E+00
-5.00E-02
-1.00E-01
-1.50E-01
-2.00E-01
-2.50E-01
-3.00E-01
0.00E+00
1.00E-01
2.00E-01
3.00E-01
4.00E-01
5.00E-01
6.00E-01
7.00E-01
40
41

Input file for Solid2D

```
2D straight edge boundary on J2 Material with impulsive loading
50 54 40 1 3 2 7000  1.e-4  1.e+2  1.e-10  0.
0 1 0 1 1
1     0.    0.        1   1
2     1.    0.        1   1
3     2.    0.        1   1
4     3.    0.        1   1
5     4.    0.        1   1
6     5.    0.        1   1
7     6.    0.        1   1
8     7.    0.        1   1
9     8.    0.        1   1
10    0.    1.        1   0
11    1.    1.        0   0
12    2.    1.        0   0
13    3.    1.        0   0
14    4.    1.        0   0
15    5.    1.        0   0
16    6.    1.        0   0
17    7.    1.        0   0
18    8.    1.        1   0
19    0.    2.        1   0
20    1.    2.        0   0
21    2.    2.        0   0
22    3.    2.        0   0
23    4.    2.        0   0
24    5.    2.        0   0
25    6.    2.        0   0
26    7.    2.        0   0
27    8.    2.        1   0
28    0.    3.        1   0
29    1.    3.        0   0
30    2.    3.        0   0
31    3.    3.        0   0
32    4.    3.        0   0
33    5.    3.        0   0
34    6.    3.        0   0
35    7.    3.        0   0
36    8.    3.        1   0
37    0.    4.        1   0
38    1.    4.        0   0
39    2.    4.        0   0
40    3.    4.        0   0
41    4.    4.        0   0
42    5.    4.        0   0
43    6.    4.        0   0
44    7.    4.        0   0
45    8.    4.        1   0
46    0.    5.        1   0
47    1.    5.        0   0
48    2.    5.        0   0
49    3.    5.        0   0
50    4.    5.        0   0
51    5.    5.        0   0
52    6.    5.        0   0
53    7.    5.        0   0
54    8.    5.        1   0
1  1  2  11  10    1  1  1  1  1
```

```
2   2   3   12   11     1   1   2   1   1
3   3   4   13   12     1   1   3   1   1
4   4   5   14   13     1   1   4   1   1
5   5   6   15   14     1   1   5   1   1
6   6   7   16   15     1   1   6   1   1
7   7   8   17   16     1   1   7   1   1
8   8   9   18   17     1   1   8   1   1
9    10   11   20   19    1   2   1   1   1
10   11   12   21   20    1   2   2   1   1
11   12   13   22   21    1   2   3   1   1
12   13   14   23   22    1   2   4   1   1
13   14   15   24   23    1   2   5   1   1
14   15   16   25   24    1   2   6   1   1
15   16   17   26   25    1   2   7   1   1
16   17   18   27   26    1   2   8   1   1
17   19   20   29   28    1   3   1   1   1
18   20   21   30   29    1   3   2   1   1
19   21   22   31   30    1   3   3   1   1
20   22   23   32   31    1   3   4   1   1
21   23   24   33   32    1   3   5   1   1
22   24   25   34   33    1   3   6   1   1
23   25   26   35   34    1   3   7   1   1
24   26   27   36   35    1   3   8   1   1
25   28   29   38   37    1   4   1   1   1
26   29   30   39   38    1   4   2   1   1
27   30   31   40   39    1   4   3   1   1
28   31   32   41   40    1   4   4   1   1
29   32   33   42   41    1   4   5   1   1
30   33   34   43   42    1   4   6   1   1
31   34   35   44   43    1   4   7   1   1
32   35   36   45   44    1   4   8   1   1
33   37   38   47   46    1   5   1   1   1
34   38   39   48   47    1   5   2   1   1
35   39   40   49   48    1   5   3   1   1
36   40   41   50   49    1   5   4   1   1
37   41   42   51   50    1   5   5   1   1
38   42   43   52   51    1   5   6   1   1
39   43   44   53   52    1   5   7   1   1
40   44   45   54   53    1   5   8   1   1
1 1 4.67e-2  9000.0  0.30  40.
0.    0.  2   0.   0.  0.4

1 2
13
0.                  0.
0.025              -100.0
0.05                0.
0.15                0.
0.175              -100.0
0.20                0.
0.30                0.
0.325              -100.0
0.350               0.
0.450               0.
0.475              -100.0
0.50                0.
0.70                0.
50  2 1
```

```
104 2 1

40 0 2
41 0 2
42 0 2
```

Sample output of Solid2D

card 1 2D straight edge boundary on J2 Material w/ impulsive load

---

card 2 parameter card

no of time-steps skipped between outputs	=	50
number of nodes	=	54
number of elements	=	40
number of materials	=	1
number of output req	=	3
no. of d.o.f/node	=	2
no. of time steps	=	7000
time increment	=	.100E-03
coeff of mass damping	=	.100E+03
tolerance limit	=	.100E-09
acceleration of gravity	=	.00000

card 3 index card

index for accel.	=	0
index for force	=	1
index for I. C.	=	0
index for mesh output(1) or not(0)	=	1
index for plane stress(1) or strain(2)	=	1

card 4 nodal point data

node no.	x-ordinate	y-ordinate	ifx	ify
1	.000	.000	1	1
2	1.000	.000	1	1
3	2.000	.000	1	1
4	3.000	.000	1	1
5	4.000	.000	1	1
6	5.000	.000	1	1
7	6.000	.000	1	1
8	7.000	.000	1	1
9	8.000	.000	1	1
10	.000	1.000	1	0
11	1.000	1.000	0	0
12	2.000	1.000	0	0
13	3.000	1.000	0	0
14	4.000	1.000	0	0
15	5.000	1.000	0	0
16	6.000	1.000	0	0
17	7.000	1.000	0	0
18	8.000	1.000	1	0
19	.000	2.000	1	0
20	1.000	2.000	0	0
21	2.000	2.000	0	0
22	3.000	2.000	0	0
23	4.000	2.000	0	0
24	5.000	2.000	0	0
25	6.000	2.000	0	0
26	7.000	2.000	0	0
27	8.000	2.000	1	0
28	.000	3.000	1	0
29	1.000	3.000	0	0
30	2.000	3.000	0	0
31	3.000	3.000	0	0
32	4.000	3.000	0	0
33	5.000	3.000	0	0

34	6.000	3.000	0	0
35	7.000	3.000	0	0
36	8.000	3.000	1	0
37	.000	4.000	1	0
38	1.000	4.000	0	0
39	2.000	4.000	0	0
40	3.000	4.000	0	0
41	4.000	4.000	0	0
42	5.000	4.000	0	0
43	6.000	4.000	0	0
44	7.000	4.000	0	0
45	8.000	4.000	1	0
46	.000	5.000	1	0
47	1.000	5.000	0	0
48	2.000	5.000	0	0
49	3.000	5.000	0	0
50	4.000	5.000	0	0
51	5.000	5.000	0	0
52	6.000	5.000	0	0
53	7.000	5.000	0	0
54	8.000	5.000	1	0

card 5 element data

ele. no.	node-1	node-2	node-3	node-4	mat-typ	row-no	col-no	ele-cond.
1	1	2	11	10	1	1	1	1
2	2	3	12	11	1	1	2	1
3	3	4	13	12	1	1	3	1
4	4	5	14	13	1	1	4	1
5	5	6	15	14	1	1	5	1
6	6	7	16	15	1	1	6	1
7	7	8	17	16	1	1	7	1
8	8	9	18	17	1	1	8	1
9	10	11	20	19	1	2	1	1
10	11	12	21	20	1	2	2	1
11	12	13	22	21	1	2	3	1
12	13	14	23	22	1	2	4	1
13	14	15	24	23	1	2	5	1
14	15	16	25	24	1	2	6	1
15	16	17	26	25	1	2	7	1
16	17	18	27	26	1	2	8	1
17	19	20	29	28	1	3	1	1
18	20	21	30	29	1	3	2	1
19	21	22	31	30	1	3	3	1
20	22	23	32	31	1	3	4	1
21	23	24	33	32	1	3	5	1
22	24	25	34	33	1	3	6	1
23	25	26	35	34	1	3	7	1
24	26	27	36	35	1	3	8	1
25	28	29	38	37	1	4	1	1
26	29	30	39	38	1	4	2	1
27	30	31	40	39	1	4	3	1
28	31	32	41	40	1	4	4	1
29	32	33	42	41	1	4	5	1
30	33	34	43	42	1	4	6	1
31	34	35	44	43	1	4	7	1
32	35	36	45	44	1	4	8	1
33	37	38	47	46	1	5	1	1
34	38	39	48	47	1	5	2	1

35	39	40	49	48	1	5	3	1
36	40	41	50	49	1	5	4	1
37	41	42	51	50	1	5	5	1
38	42	43	52	51	1	5	6	1
39	43	44	53	52	1	5	7	1
40	44	45	54	53	1	5	8	1

card 6 & 7 material property data

material group no.	material type no.	mass density	Youngs modulus	Poisson ratio	tensile strength
1	1	.4670E-01	.9000E+04	.300	.4000E+02

cohesion	phi angle	yield criterion	tangent modulus	hardening rule	thickness(b)
.0000E+00	.00	2	.0000E+00	.000	.400

card 11 prescribed impact force

total no. of impact force history = 1

total no. of nodes applied by impact force = 2

card 12 & 13 impact force history card

force history no.	pair no.	time	iforce
1	1	.0000E+00	.0000E+00
1	2	.2500E-01	-.1000E+03
1	3	.5000E-01	.0000E+00
1	4	.1500E+00	.0000E+00
1	5	.1750E+00	-.1000E+03
1	6	.2000E+00	.0000E+00
1	7	.3000E+00	.0000E+00
1	8	.3250E+00	-.1000E+03
1	9	.3500E+00	.0000E+00
1	10	.4500E+00	.0000E+00
1	11	.4750E+00	-.1000E+03
1	12	.5000E+00	.0000E+00
1	13	.7000E+00	.0000E+00

card 14 nodal impact force information

node no.	x-(1),y(2)	force history no.
50	2	1
104	2	1

card 21 stress output information card

seq.	node#	d-(0),v-(1),a-(2),sig-(3)	x(1),y(2),xy(3)
1	40	0	2
2	41	0	2
3	42	0	2

nstep= 50

Plastic element no [element no.Gauss point no] =

NONE

nstep= 100

Plastic element no [element no.Gauss point no] =

36.2 36.3 36.4 37.1 37.3 37.4

nstep= 150

Plastic element no [element no.Gauss point no] =

```
   28.2    28.3    28.4    29.1    29.3    29.4    36.1    36.2
   36.3    36.4    37.1    37.2    37.3    37.4
nstep=        200

 Plastic element no [element no.Gauss point no] =
   20.3    21.4    27.3    28.1    28.2    28.3    28.4    29.1
   29.2    29.3    29.4    30.4    35.1    35.2    35.3    35.4
   36.1    36.2    36.3    36.4    37.1    37.2    37.3    37.4
   38.1    38.2    38.3    38.4
nstep=        250

 Plastic element no [element no.Gauss point no] =
   20.1    20.2    20.3    20.4    21.1    21.2    21.3    21.4
   27.1    27.2    27.3    27.4    28.1    28.2    28.3    28.4
   29.1    29.2    29.3    29.4    30.1    30.2    30.3    30.4
   35.1    35.2    35.3    35.4    36.1    36.2    36.3    36.4
   37.1    37.2    37.3    37.4    38.1    38.2    38.3    38.4
nstep=        300

 Plastic element no [element no.Gauss point no] =
   12.2    12.3    12.4    13.1    13.3    13.4    19.3    20.1
   20.2    20.3    20.4    21.1    21.2    21.3    21.4    22.4
   26.3    26.4    27.1    27.2    27.3    27.4    28.1    28.2
   28.3    28.4    29.1    29.2    29.3    29.4    30.1    30.2
   30.3    30.4    31.3    31.4    33.3    33.4    34.1    34.2
   34.3    34.4    35.1    35.2    35.3    35.4    36.1    36.2
   36.3    36.4    37.1    37.2    37.3    37.4    38.1    38.2
   38.3    38.4    39.1    39.2    39.3    39.4    40.3    40.4
nstep=        350

 Plastic element no [element no.Gauss point no] =
   12.1    12.2    12.3    12.4    13.1    13.2    13.3    13.4
   19.2    19.3    19.4    20.1    20.2    20.3    20.4    21.1
   21.2    21.3    21.4    22.1    22.3    22.4    26.1    26.2
   26.3    26.4    27.1    27.2    28.1    28.2    28.3    28.4
   29.1    29.2    29.3    29.4    30.1    30.2    31.1    31.2
   31.3    31.4    33.1    33.2    33.3    33.4    34.1    34.2
   34.3    34.4    35.2    35.4    36.1    36.2    36.3    36.4
   37.1    37.2    37.3    37.4    38.1    38.3    39.1    39.2
   39.3    39.4    40.1    40.2    40.3    40.4
nstep=        400

 Plastic element no [element no.Gauss point no] =
   12.1    12.2    12.3    12.4    13.1    13.2    13.3    13.4
   18.3    18.4    20.1    20.2    20.3    20.4    21.1    21.2
   21.3    21.4    23.3    23.4    25.2    25.3    25.4    26.1
   26.2    26.4    28.1    28.2    28.3    28.4    29.1    29.2
   29.3    29.4    31.1    31.2    31.3    32.1    32.3    32.4
   33.1    33.2    35.3    36.2    36.3    37.1    37.4    38.4
   40.1    40.2
nstep=        450

 Plastic element no [element no.Gauss point no] =
    4.3     5.4    12.1    12.2    12.3    12.4    13.1    13.2
   13.3    13.4    25.1    25.2    28.3    29.4    32.1    32.2
   35.3    35.4    36.2    36.3    36.4    37.1    37.3    37.4
   38.3    38.4
nstep=        500
```

```
 Plastic element no [element no.Gauss point no] =
   28.2    28.3    29.1    29.4    36.1    36.2    36.3    36.4
   37.1    37.2    37.3    37.4
nstep=        550

 Plastic element no [element no.Gauss point no] =
   28.1    28.2    28.3    28.4    29.1    29.2    29.3    29.4
   35.2    35.3    36.1    36.2    36.3    36.4    37.1    37.2
   37.3    37.4    38.1    38.4
nstep=        600

 Plastic element no [element no.Gauss point no] =
   20.2    20.3    21.1    21.4    27.3    28.1    28.2    28.3
   28.4    29.1    29.2    29.3    29.4    30.4    36.1    36.2
   36.3    36.4    37.1    37.2    37.3    37.4
nstep=        650

 Plastic element no [element no.Gauss point no] =
   19.3    20.2    20.3    20.4    21.1    21.3    21.4    22.4
   27.2    27.3    28.1    28.2    28.3    28.4    29.1    29.2
   29.3    29.4    30.1    30.4    36.1    36.2    36.3    36.4
   37.1    37.2    37.3    37.4
nstep=        700

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=        750

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=        800

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=        850

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=        900

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=        950

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       1000

 Plastic element no [element no.Gauss point no] =

     NONE
```

```
nstep=       1050

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       1100

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       1150

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       1200

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       1250

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       1300

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       1350

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       1400

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       1450

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       1500

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       1550

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       1600

 Plastic element no [element no.Gauss point no] =
```

```
   36.2    36.3    37.1    37.4
nstep=       1650

 Plastic element no [element no.Gauss point no] =
   36.2    36.3    36.4    37.1    37.3    37.4
nstep=       1700

 Plastic element no [element no.Gauss point no] =
   28.2    28.3    28.4    29.1    29.3    29.4    36.1    36.2
   36.3    36.4    37.1    37.2    37.3    37.4
nstep=       1750

 Plastic element no [element no.Gauss point no] =
    4.2     4.3     4.4     5.1     5.3     5.4    12.1    12.2
   12.3    13.1    13.2    13.4    20.2    20.3    21.1    21.4
   28.1    28.2    28.3    28.4    29.1    29.2    29.3    29.4
   36.1    36.2    36.3    36.4    37.1    37.2    37.3    37.4
nstep=       1800

 Plastic element no [element no.Gauss point no] =
    4.2     4.3     4.4     5.1     5.3     5.4    12.1    12.2
   12.3    12.4    13.1    13.2    13.3    13.4    19.1    19.2
   19.3    19.4    20.1    20.2    20.3    20.4    21.1    21.2
   21.3    21.4    22.1    22.2    22.3    22.4    27.1    27.2
   27.3    27.4    28.1    28.2    28.3    28.4    29.1    29.2
   29.3    29.4    30.1    30.2    30.3    30.4    36.1    36.2
   36.3    36.4    37.1    37.2    37.3    37.4
nstep=       1850

 Plastic element no [element no.Gauss point no] =
    4.2     4.3     4.4     5.1     5.3     5.4    12.1    12.2
   12.3    12.4    13.1    13.2    13.3    13.4    18.3    18.4
   19.1    19.2    19.3    19.4    20.1    20.2    20.3    20.4
   21.1    21.2    21.3    21.4    22.1    22.2    22.3    22.4
   23.3    23.4    25.1    25.2    25.3    25.4    26.1    26.2
   26.3    26.4    27.1    27.2    28.1    28.2    28.3    28.4
   29.1    29.2    29.3    29.4    30.1    30.2    31.1    31.2
   31.3    31.4    32.1    32.2    32.3    32.4    33.1    33.2
   33.3    33.4    34.1    34.2    34.3    35.2    35.3    35.4
   36.1    36.2    36.3    36.4    37.1    37.2    37.3    37.4
   38.1    38.3    38.4    39.1    39.2    39.4    40.1    40.2
   40.3    40.4
nstep=       1900

 Plastic element no [element no.Gauss point no] =
    4.2     4.3     4.4     5.1     5.3     5.4    11.3    12.1
   12.2    12.3    12.4    13.1    13.2    13.3    13.4    14.4
   17.3    17.4    18.2    18.3    18.4    19.1    20.1    20.2
   20.3    20.4    21.1    21.2    21.3    21.4    22.2    23.1
   23.3    23.4    24.3    24.4    25.1    25.2    25.3    26.1
   26.2    28.1    28.2    28.3    29.1    29.2    29.4    31.1
   31.2    32.1    32.2    32.4    35.3    35.4    36.2    36.3
   37.1    37.4    38.3    38.4
nstep=       1950

 Plastic element no [element no.Gauss point no] =
    4.1     4.2     4.3     4.4     5.1     5.2     5.3     5.4
   17.3    17.4    24.3    24.4    28.2    28.3    29.1    29.4
```

```
   36.1    36.2    36.3    36.4    37.1    37.2    37.3    37.4
nstep=       2000

 Plastic element no [element no.Gauss point no] =
   27.2    28.2    28.3    29.1    29.4    30.1    35.2    35.3
   36.1    36.2    36.3    36.4    37.1    37.2    37.3    37.4
   38.1    38.4
nstep=       2050

 Plastic element no [element no.Gauss point no] =
   28.1    28.2    28.3    28.4    29.1    29.2    29.3    29.4
   35.2    35.3    36.1    36.2    36.3    36.4    37.1    37.2
   37.3    37.4    38.1    38.4
nstep=       2100

 Plastic element no [element no.Gauss point no] =
   19.2    20.2    20.3    21.1    21.4    22.1    27.2    28.1
   28.2    28.3    28.4    29.1    29.2    29.3    29.4    30.1
   36.1    36.2    36.3    36.4    37.1    37.2    37.3    37.4
nstep=       2150

 Plastic element no [element no.Gauss point no] =
   19.2    19.3    20.1    20.2    20.3    20.4    21.1    21.2
   21.3    21.4    22.1    22.4    27.2    27.3    28.1    28.2
   28.3    28.4    29.1    29.2    29.3    29.4    30.1    30.4
   36.1    36.2    36.3    36.4    37.1    37.2    37.3    37.4
nstep=       2200

 Plastic element no [element no.Gauss point no] =
   19.2    20.1    20.3    20.4    21.2    21.3    21.4    22.1
   36.1    36.2    36.3    36.4    37.1    37.2    37.3    37.4
nstep=       2250

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       2300

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       2350

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       2400

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       2450

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       2500
```

```
 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       2550

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       2600

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       2650

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       2700

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       2750

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       2800

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       2850

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       2900

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       2950

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       3000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       3050

 Plastic element no [element no.Gauss point no] =

     NONE
```

```
nstep=       3100

 Plastic element no [element no.Gauss point no] =
   36.2    36.3    37.1    37.4
nstep=       3150

 Plastic element no [element no.Gauss point no] =
   36.2    36.3    36.4    37.1    37.3    37.4
nstep=       3200

 Plastic element no [element no.Gauss point no] =
   28.2    28.3    28.4    29.1    29.3    29.4    36.1    36.2
   36.3    36.4    37.1    37.2    37.3    37.4
nstep=       3250

 Plastic element no [element no.Gauss point no] =
    4.1     4.2     4.3     4.4     5.1     5.2     5.3     5.4
   12.2    12.3    13.1    13.4    28.1    28.2    28.3    28.4
   29.1    29.2    29.3    29.4    36.1    36.2    36.3    36.4
   37.1    37.2    37.3    37.4
nstep=       3300

 Plastic element no [element no.Gauss point no] =
    4.1     4.2     4.3     4.4     5.1     5.2     5.3     5.4
   11.3    11.4    12.1    12.2    12.3    12.4    13.1    13.2
   13.3    13.4    14.3    14.4    20.1    20.2    20.3    20.4
   21.1    21.2    21.3    21.4    28.1    28.2    28.3    28.4
   29.1    29.2    29.3    29.4    36.1    36.2    36.3    36.4
   37.1    37.2    37.3    37.4
nstep=       3350

 Plastic element no [element no.Gauss point no] =
    4.1     4.2     4.3     4.4     5.1     5.2     5.3     5.4
   11.3    11.4    12.1    12.2    12.3    12.4    13.1    13.2
   13.3    13.4    14.3    14.4    17.3    17.4    18.1    18.2
   19.1    19.2    19.3    19.4    20.1    20.2    20.3    20.4
   21.1    21.2    21.3    21.4    22.1    22.2    22.3    22.4
   23.1    23.2    24.3    24.4    25.1    25.2    25.3    25.4
   26.1    26.2    26.3    26.4    27.1    28.1    28.2    28.3
   28.4    29.1    29.2    29.3    29.4    30.2    31.1    31.2
   31.3    31.4    32.1    32.2    32.3    32.4    33.1    33.2
   34.1    34.2    34.3    35.2    35.3    35.4    36.1    36.2
   36.3    36.4    37.1    37.2    37.3    37.4    38.1    38.3
   38.4    39.1    39.2    39.4    40.1    40.2
nstep=       3400

 Plastic element no [element no.Gauss point no] =
    4.1     4.2     4.3     4.4     5.1     5.2     5.3     5.4
   11.2    11.3    11.4    12.1    12.2    12.3    12.4    13.1
   13.2    13.3    13.4    14.1    14.3    14.4    17.3    17.4
   18.1    18.2    18.3    18.4    19.1    20.1    20.2    20.3
   20.4    21.1    21.2    21.3    21.4    22.2    23.1    23.2
   23.3    23.4    24.3    24.4    25.1    25.2    26.1    26.2
   28.2    29.1    31.1    31.2    32.1    32.2    36.2    36.3
   36.4    37.1    37.3    37.4
nstep=       3450

 Plastic element no [element no.Gauss point no] =
```

```
    4.1     4.2     4.3     4.4     5.1     5.2     5.3     5.4
   10.3    15.4    17.1    17.2    17.3    17.4    24.1    24.2
   24.3    24.4    25.1    28.2    28.3    29.1    29.4    32.2
   36.1    36.2    36.3    36.4    37.1    37.2    37.3    37.4
nstep=       3500

 Plastic element no [element no.Gauss point no] =
   27.2    28.2    28.3    29.1    29.4    30.1    35.2    36.1
   36.2    36.3    36.4    37.1    37.2    37.3    37.4    38.1
nstep=       3550

 Plastic element no [element no.Gauss point no] =
   11.3    11.4    14.3    14.4    28.1    28.2    28.3    28.4
   29.1    29.2    29.3    29.4    35.2    36.1    36.2    36.3
   36.4    37.1    37.2    37.3    37.4    38.1
nstep=       3600

 Plastic element no [element no.Gauss point no] =
   11.3    14.4    19.2    19.3    20.2    20.3    21.1    21.4
   22.1    22.4    27.2    28.1    28.2    28.3    28.4    29.1
   29.2    29.3    29.4    30.1    36.1    36.2    36.3    36.4
   37.1    37.2    37.3    37.4
nstep=       3650

 Plastic element no [element no.Gauss point no] =
   19.2    19.3    19.4    20.1    20.2    20.3    20.4    21.1
   21.2    21.3    21.4    22.1    22.3    22.4    27.3    28.1
   28.2    28.3    28.4    29.1    29.2    29.3    29.4    30.4
   36.1    36.2    36.3    36.4    37.1    37.2    37.3    37.4
nstep=       3700

 Plastic element no [element no.Gauss point no] =
   19.2    19.3    20.1    20.2    20.3    20.4    21.1    21.2
   21.3    21.4    22.1    22.4    28.1    28.2    28.3    28.4
   29.1    29.2    29.3    29.4    36.1    36.2    36.3    36.4
   37.1    37.2    37.3    37.4
nstep=       3750

 Plastic element no [element no.Gauss point no] =
   11.2    11.3    11.4    14.1    14.3    14.4    19.2    22.1
nstep=       3800

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       3850

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       3900

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       3950

 Plastic element no [element no.Gauss point no] =
```

```
     NONE
nstep=       4000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       4050

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       4100

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       4150

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       4200

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       4250

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       4300

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       4350

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       4400

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       4450

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       4500

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       4550
```

```
 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       4600

 Plastic element no [element no.Gauss point no] =
   36.2    36.3    37.1    37.4
nstep=       4650

 Plastic element no [element no.Gauss point no] =
   36.2    36.3    36.4    37.1    37.3    37.4
nstep=       4700

 Plastic element no [element no.Gauss point no] =
   28.2    28.3    28.4    29.1    29.3    29.4    36.1    36.2
   36.3    36.4    37.1    37.2    37.3    37.4
nstep=       4750

 Plastic element no [element no.Gauss point no] =
    3.3     4.1     4.2     4.3     4.4     5.1     5.2     5.3
    5.4     6.4    12.2    13.1    28.1    28.2    28.3    28.4
   29.1    29.2    29.3    29.4    36.1    36.2    36.3    36.4
   37.1    37.2    37.3    37.4
nstep=       4800

 Plastic element no [element no.Gauss point no] =
    4.3     5.4    12.2    12.3    13.1    13.4    20.2    20.3
   20.4    21.1    21.3    21.4    28.1    28.2    28.3    28.4
   29.1    29.2    29.3    29.4    36.1    36.2    36.3    36.4
   37.1    37.2    37.3    37.4
nstep=       4850

 Plastic element no [element no.Gauss point no] =
    4.2     4.3     4.4     5.1     5.3     5.4    12.1    12.2
   12.3    12.4    13.1    13.2    13.3    13.4    20.1    20.2
   20.3    20.4    21.1    21.2    21.3    21.4    25.1    25.2
   25.3    25.4    26.3    26.4    28.1    28.2    28.3    28.4
   29.1    29.2    29.3    29.4    31.3    31.4    32.1    32.2
   32.3    32.4    34.2    34.3    35.2    35.3    35.4    36.1
   36.2    36.3    36.4    37.1    37.2    37.3    37.4    38.1
   38.3    38.4    39.1    39.4
nstep=       4900

 Plastic element no [element no.Gauss point no] =
    4.1     4.2     4.3     4.4     5.1     5.2     5.3     5.4
   11.2    11.3    11.4    12.1    12.2    12.3    12.4    13.1
   13.2    13.3    13.4    14.1    14.3    14.4    17.3    17.4
   18.1    18.2    18.3    18.4    19.1    20.1    20.2    20.3
   20.4    21.1    21.2    21.3    21.4    22.2    23.1    23.2
   23.3    23.4    24.3    24.4    28.2    29.1    36.2    36.3
   36.4    37.1    37.3    37.4
nstep=       4950

 Plastic element no [element no.Gauss point no] =
    3.2     3.3     4.1     4.2     4.3     4.4     5.1     5.2
    5.3     5.4     6.1     6.4    10.3    10.4    15.3    15.4
   17.1    17.2    17.3    17.4    24.1    24.2    24.3    24.4
```

```
   25.1    28.2    28.3    29.1    29.4    32.2    36.1    36.2
   36.3    36.4    37.1    37.2    37.3    37.4
nstep=       5000

 Plastic element no [element no.Gauss point no] =
   27.2    28.2    28.3    29.1    29.4    30.1    36.1    36.2
   36.3    36.4    37.1    37.2    37.3    37.4
nstep=       5050

 Plastic element no [element no.Gauss point no] =
   11.3    11.4    14.3    14.4    19.1    19.2    22.1    22.2
   28.1    28.2    28.3    28.4    29.1    29.2    29.3    29.4
   36.1    36.2    36.3    36.4    37.1    37.2    37.3    37.4
nstep=       5100

 Plastic element no [element no.Gauss point no] =
   11.2    11.3    14.1    14.4    19.2    19.3    20.2    20.3
   21.1    21.4    22.1    22.4    27.2    28.1    28.2    28.3
   28.4    29.1    29.2    29.3    29.4    30.1    35.1    36.1
   36.2    36.3    36.4    37.1    37.2    37.3    37.4    38.2
nstep=       5150

 Plastic element no [element no.Gauss point no] =
   19.1    19.2    19.3    19.4    20.1    20.2    20.3    20.4
   21.1    21.2    21.3    21.4    22.1    22.2    22.3    22.4
   27.3    28.1    28.2    28.3    28.4    29.1    29.2    29.3
   29.4    30.4    35.1    36.1    36.2    36.3    36.4    37.1
   37.2    37.3    37.4    38.2
nstep=       5200

 Plastic element no [element no.Gauss point no] =
   19.3    20.1    20.2    20.3    20.4    21.1    21.2    21.3
   21.4    22.4    28.1    28.2    28.3    28.4    29.1    29.2
   29.3    29.4    35.1    36.1    36.2    36.3    36.4    37.1
   37.2    37.3    37.4    38.2
nstep=       5250

 Plastic element no [element no.Gauss point no] =
   11.1    11.2    11.3    11.4    14.1    14.2    14.3    14.4
   19.2    19.3    22.1    22.4
nstep=       5300

 Plastic element no [element no.Gauss point no] =
   35.1    38.2
nstep=       5350

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       5400

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       5450

 Plastic element no [element no.Gauss point no] =
```

```
     NONE
nstep=       5500

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       5550

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       5600

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       5650

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       5700

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       5750

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       5800

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       5850

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       5900

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       5950

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       6000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       6050
```

```
 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       6100

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       6150

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       6200

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       6250

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       6300

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       6350

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       6400

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       6450

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       6500

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       6550

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       6600

 Plastic element no [element no.Gauss point no] =

     NONE
```

```
nstep=       6650

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       6700

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       6750

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       6800

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       6850

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       6900

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       6950

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       7000

 Plastic element no [element no.Gauss point no] =

     NONE
nstep=       7000

 Plastic element no =>[Element no.Gauss point no] =

     NONE
```

card 21 stress output information card

	seq.	node#	d-(0),v-(1),a-(2),sig-(3)	x(1),y(2),xy(3)
	1	40	0	2
	2	41	0	2
	3	42	0	2
time =	.50000E-02	-.277E-03	-.700E-03	-.277E-03
time =	.10000E-01	-.225E-02	-.547E-02	-.225E-02
time =	.15000E-01	-.509E-02	-.136E-01	-.509E-02
time =	.20000E-01	-.612E-02	-.318E-01	-.612E-02
time =	.25000E-01	-.589E-02	-.605E-01	-.589E-02
time =	.30000E-01	-.432E-02	-.979E-01	-.432E-02
time =	.35000E-01	-.438E-03	-.133E+00	-.438E-03
time =	.40000E-01	-.923E-03	-.149E+00	-.923E-03
time =	.45000E-01	-.192E-02	-.147E+00	-.192E-02
time =	.50000E-01	.232E-02	-.141E+00	.232E-02
time =	.55000E-01	.655E-02	-.128E+00	.655E-02
time =	.60000E-01	.965E-02	-.114E+00	.965E-02
time =	.65000E-01	.123E-01	-.107E+00	.123E-01
time =	.70000E-01	.127E-01	-.107E+00	.127E-01
time =	.75000E-01	.112E-01	-.110E+00	.112E-01
time =	.80000E-01	.101E-01	-.111E+00	.101E-01
time =	.85000E-01	.946E-02	-.111E+00	.946E-02
time =	.90000E-01	.929E-02	-.112E+00	.929E-02
time =	.95000E-01	.947E-02	-.112E+00	.947E-02
time =	.10000E+00	.966E-02	-.111E+00	.966E-02
time =	.10500E+00	.980E-02	-.111E+00	.980E-02
time =	.11000E+00	.991E-02	-.111E+00	.991E-02
time =	.11500E+00	.998E-02	-.111E+00	.998E-02
time =	.12000E+00	.100E-01	-.111E+00	.100E-01
time =	.12500E+00	.100E-01	-.111E+00	.100E-01
time =	.13000E+00	.994E-02	-.111E+00	.994E-02
time =	.13500E+00	.986E-02	-.111E+00	.986E-02
time =	.14000E+00	.981E-02	-.111E+00	.981E-02
time =	.14500E+00	.982E-02	-.111E+00	.982E-02
time =	.15000E+00	.985E-02	-.111E+00	.985E-02
time =	.15500E+00	.965E-02	-.112E+00	.965E-02
time =	.16000E+00	.761E-02	-.117E+00	.761E-02
time =	.16500E+00	.341E-02	-.123E+00	.341E-02
time =	.17000E+00	-.116E-03	-.132E+00	-.116E-03
time =	.17500E+00	-.129E-02	-.151E+00	-.129E-02
time =	.18000E+00	.328E-03	-.178E+00	.328E-03
time =	.18500E+00	.230E-02	-.201E+00	.230E-02
time =	.19000E+00	.113E-02	-.207E+00	.113E-02
time =	.19500E+00	.198E-02	-.203E+00	.198E-02
time =	.20000E+00	.587E-02	-.195E+00	.587E-02
time =	.20500E+00	.890E-02	-.179E+00	.890E-02
time =	.21000E+00	.111E-01	-.161E+00	.111E-01
time =	.21500E+00	.129E-01	-.149E+00	.129E-01
time =	.22000E+00	.136E-01	-.146E+00	.136E-01
time =	.22500E+00	.134E-01	-.147E+00	.134E-01
time =	.23000E+00	.125E-01	-.149E+00	.125E-01
time =	.23500E+00	.114E-01	-.149E+00	.114E-01
time =	.24000E+00	.111E-01	-.150E+00	.111E-01
time =	.24500E+00	.109E-01	-.150E+00	.109E-01
time =	.25000E+00	.112E-01	-.150E+00	.112E-01
time =	.25500E+00	.114E-01	-.149E+00	.114E-01
time =	.26000E+00	.116E-01	-.149E+00	.116E-01
time =	.26500E+00	.116E-01	-.149E+00	.116E-01
time =	.27000E+00	.116E-01	-.149E+00	.116E-01

time =	.27500E+00	.116E-01	-.149E+00	.116E-01
time =	.28000E+00	.116E-01	-.149E+00	.116E-01
time =	.28500E+00	.115E-01	-.149E+00	.115E-01
time =	.29000E+00	.115E-01	-.149E+00	.115E-01
time =	.29500E+00	.115E-01	-.149E+00	.115E-01
time =	.30000E+00	.115E-01	-.149E+00	.115E-01
time =	.30500E+00	.113E-01	-.150E+00	.113E-01
time =	.31000E+00	.929E-02	-.155E+00	.929E-02
time =	.31500E+00	.513E-02	-.162E+00	.513E-02
time =	.32000E+00	.177E-02	-.171E+00	.177E-02
time =	.32500E+00	.545E-03	-.190E+00	.545E-03
time =	.33000E+00	.200E-02	-.217E+00	.200E-02
time =	.33500E+00	.353E-02	-.240E+00	.353E-02
time =	.34000E+00	.180E-02	-.245E+00	.180E-02
time =	.34500E+00	.293E-02	-.240E+00	.293E-02
time =	.35000E+00	.677E-02	-.230E+00	.677E-02
time =	.35500E+00	.936E-02	-.213E+00	.936E-02
time =	.36000E+00	.113E-01	-.192E+00	.113E-01
time =	.36500E+00	.130E-01	-.178E+00	.130E-01
time =	.37000E+00	.139E-01	-.173E+00	.139E-01
time =	.37500E+00	.141E-01	-.173E+00	.141E-01
time =	.38000E+00	.135E-01	-.175E+00	.135E-01
time =	.38500E+00	.122E-01	-.175E+00	.122E-01
time =	.39000E+00	.117E-01	-.176E+00	.117E-01
time =	.39500E+00	.114E-01	-.176E+00	.114E-01
time =	.40000E+00	.116E-01	-.176E+00	.116E-01
time =	.40500E+00	.120E-01	-.176E+00	.120E-01
time =	.41000E+00	.121E-01	-.175E+00	.121E-01
time =	.41500E+00	.122E-01	-.176E+00	.122E-01
time =	.42000E+00	.122E-01	-.175E+00	.122E-01
time =	.42500E+00	.122E-01	-.175E+00	.122E-01
time =	.43000E+00	.121E-01	-.176E+00	.121E-01
time =	.43500E+00	.121E-01	-.176E+00	.121E-01
time =	.44000E+00	.121E-01	-.176E+00	.121E-01
time =	.44500E+00	.121E-01	-.176E+00	.121E-01
time =	.45000E+00	.121E-01	-.176E+00	.121E-01
time =	.45500E+00	.119E-01	-.176E+00	.119E-01
time =	.46000E+00	.989E-02	-.182E+00	.989E-02
time =	.46500E+00	.573E-02	-.188E+00	.573E-02
time =	.47000E+00	.248E-02	-.198E+00	.248E-02
time =	.47500E+00	.128E-02	-.217E+00	.128E-02
time =	.48000E+00	.276E-02	-.244E+00	.276E-02
time =	.48500E+00	.412E-02	-.267E+00	.412E-02
time =	.49000E+00	.205E-02	-.272E+00	.205E-02
time =	.49500E+00	.326E-02	-.267E+00	.326E-02
time =	.50000E+00	.718E-02	-.256E+00	.718E-02
time =	.50500E+00	.958E-02	-.238E+00	.958E-02
time =	.51000E+00	.115E-01	-.215E+00	.115E-01
time =	.51500E+00	.131E-01	-.200E+00	.131E-01
time =	.52000E+00	.140E-01	-.193E+00	.140E-01
time =	.52500E+00	.145E-01	-.192E+00	.145E-01
time =	.53000E+00	.142E-01	-.194E+00	.142E-01
time =	.53500E+00	.128E-01	-.195E+00	.128E-01
time =	.54000E+00	.122E-01	-.196E+00	.122E-01
time =	.54500E+00	.118E-01	-.196E+00	.118E-01
time =	.55000E+00	.120E-01	-.196E+00	.120E-01
time =	.55500E+00	.124E-01	-.195E+00	.124E-01
time =	.56000E+00	.125E-01	-.195E+00	.125E-01
time =	.56500E+00	.126E-01	-.195E+00	.126E-01
time =	.57000E+00	.126E-01	-.195E+00	.126E-01

```
time =  .57500E+00  .126E-01 -.195E+00  .126E-01
time =  .58000E+00  .126E-01 -.195E+00  .126E-01
time =  .58500E+00  .125E-01 -.195E+00  .125E-01
time =  .59000E+00  .125E-01 -.195E+00  .125E-01
time =  .59500E+00  .125E-01 -.195E+00  .125E-01
time =  .60000E+00  .125E-01 -.195E+00  .125E-01
time =  .60500E+00  .125E-01 -.195E+00  .125E-01
time =  .61000E+00  .125E-01 -.195E+00  .125E-01
time =  .61500E+00  .125E-01 -.195E+00  .125E-01
time =  .62000E+00  .125E-01 -.195E+00  .125E-01
time =  .62500E+00  .125E-01 -.195E+00  .125E-01
time =  .63000E+00  .125E-01 -.195E+00  .125E-01
time =  .63500E+00  .125E-01 -.195E+00  .125E-01
time =  .64000E+00  .125E-01 -.195E+00  .125E-01
time =  .64500E+00  .125E-01 -.195E+00  .125E-01
time =  .65000E+00  .125E-01 -.195E+00  .125E-01
time =  .65500E+00  .125E-01 -.195E+00  .125E-01
time =  .66000E+00  .125E-01 -.195E+00  .125E-01
time =  .66500E+00  .125E-01 -.195E+00  .125E-01
time =  .67000E+00  .125E-01 -.195E+00  .125E-01
time =  .67500E+00  .125E-01 -.195E+00  .125E-01
time =  .68000E+00  .125E-01 -.195E+00  .125E-01
time =  .68500E+00  .125E-01 -.195E+00  .125E-01
time =  .69000E+00  .125E-01 -.195E+00  .125E-01
time =  .69500E+00  .125E-01 -.195E+00  .125E-01
time =  .70000E+00  .125E-01 -.195E+00  .125E-01
```

Problem 5.

A rectangular plate of viscoelastic material of maxwell type subjected to ramp loadings

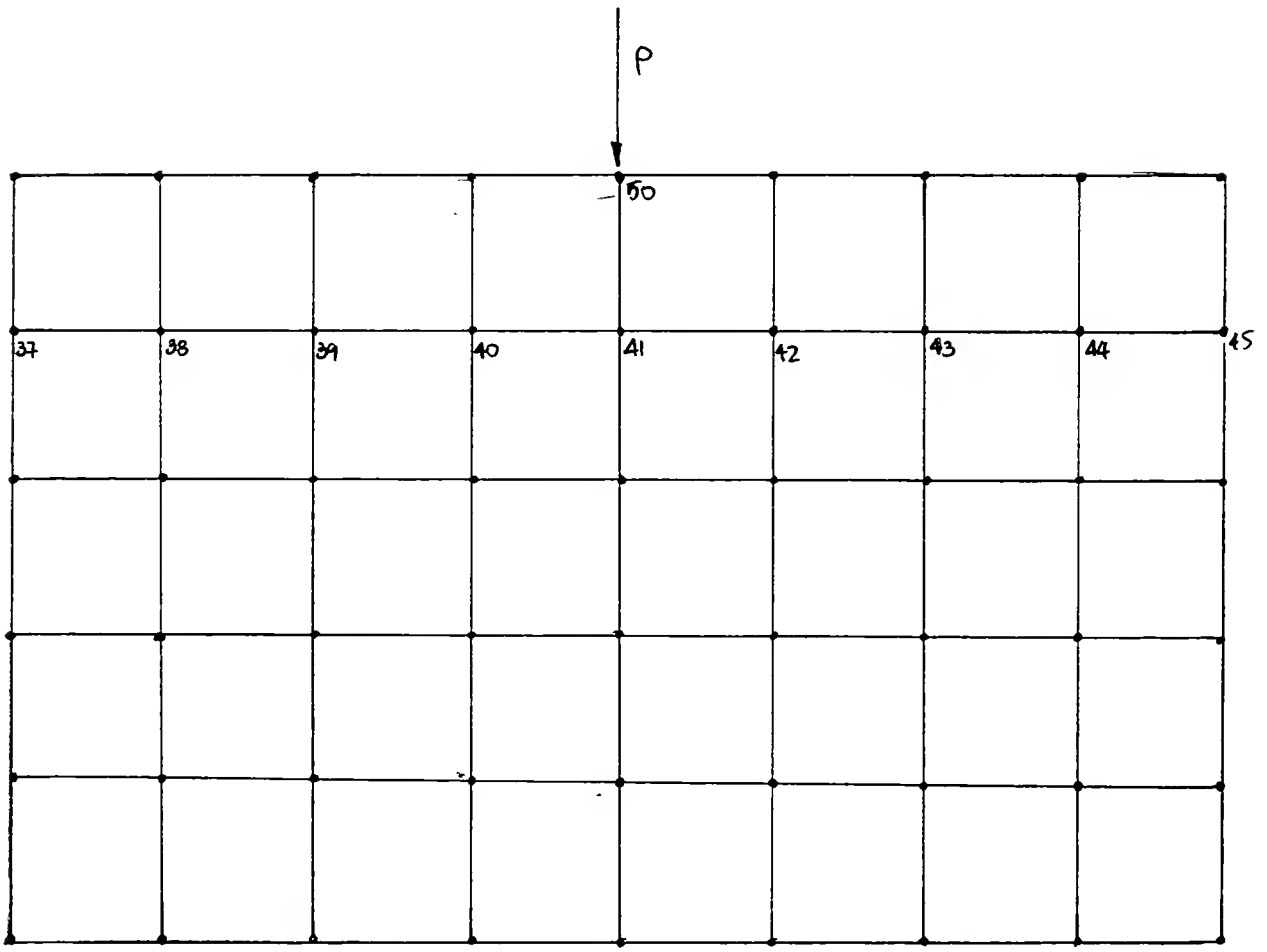
- **Problem description and loading functions**
- **Deflection and stress plots**
- **Input file for Soild2D**
- **Sample output of Soild2D**

Problem description and loading functions

2D Straight edge boundary with ramp loading on viscoelastic material

Input data:

1. Geometry and Finite element mesh are shown below:



2. Material has the following properties.

E	=	9000 psi
υ	=	0.3
τ	=	6.0 sec. (for viscoelastic)
ρ	=	4.67e-2 lb-sec^2/in^4
b	=	0.4 in (plane stress with thickness)

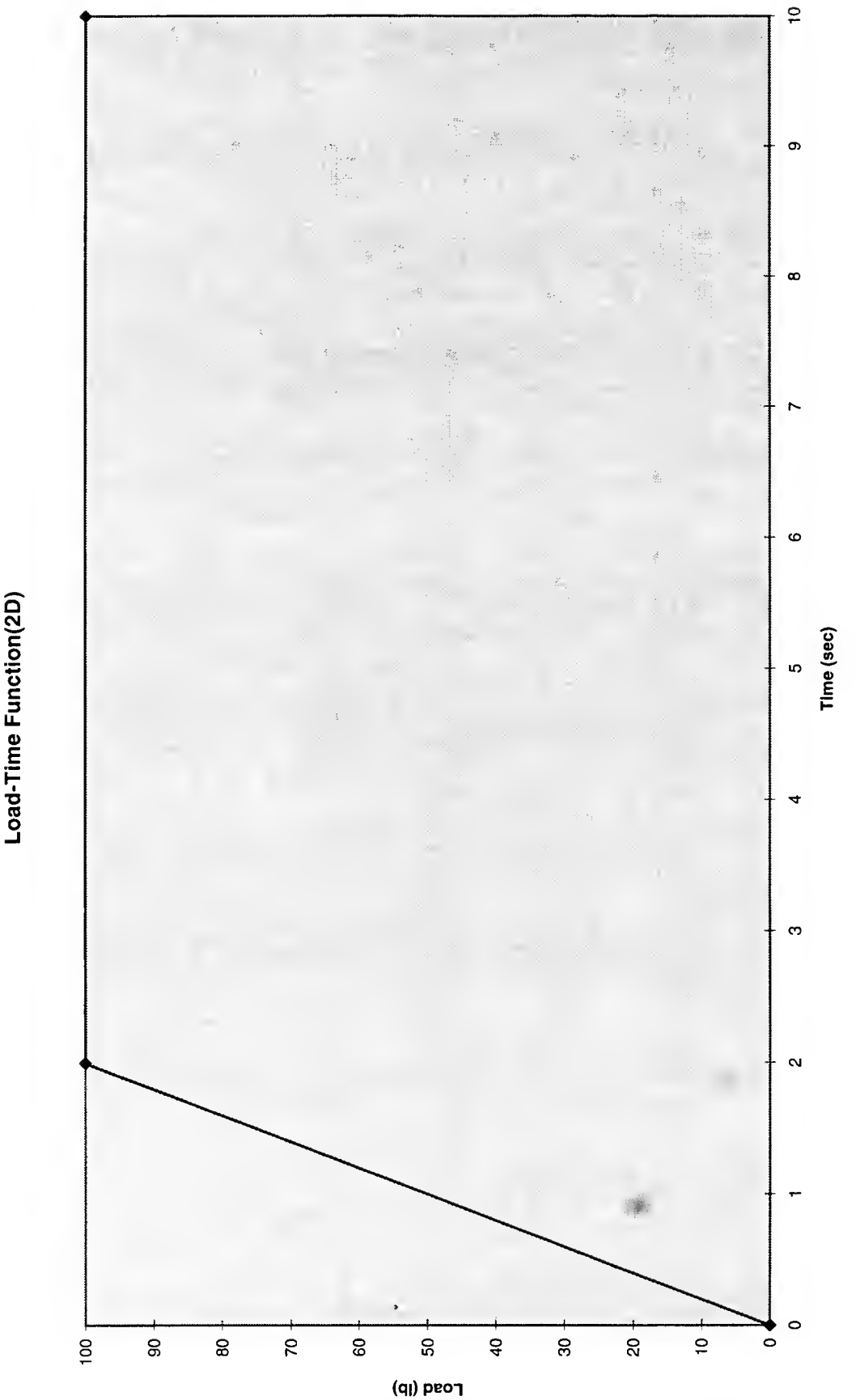
3. Load-time function is shown in the next following section.

4. The input data and output information are shown in the next following section.

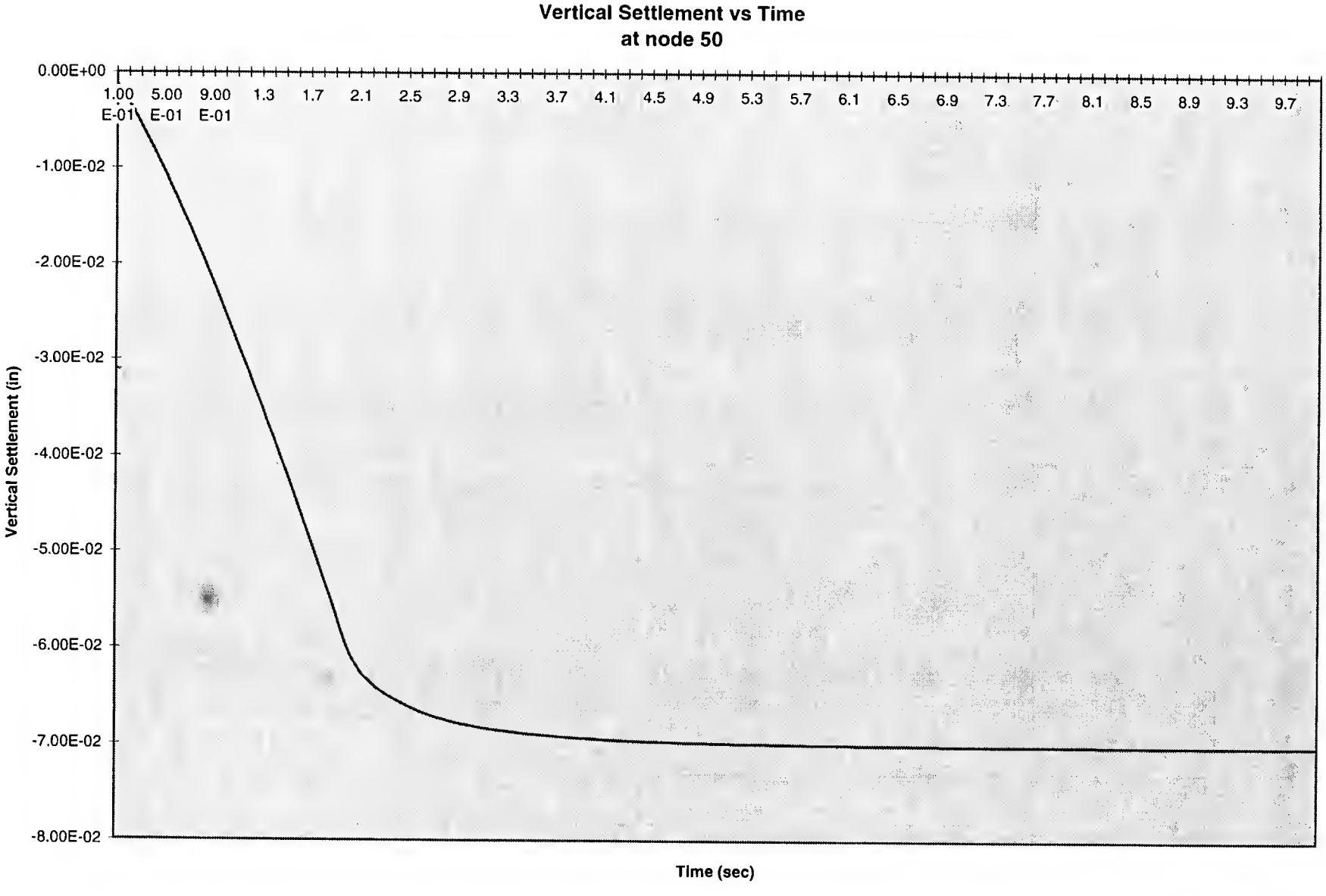
Problem Result

1. The vertical settlements of node 50 are plotted with respected to time.

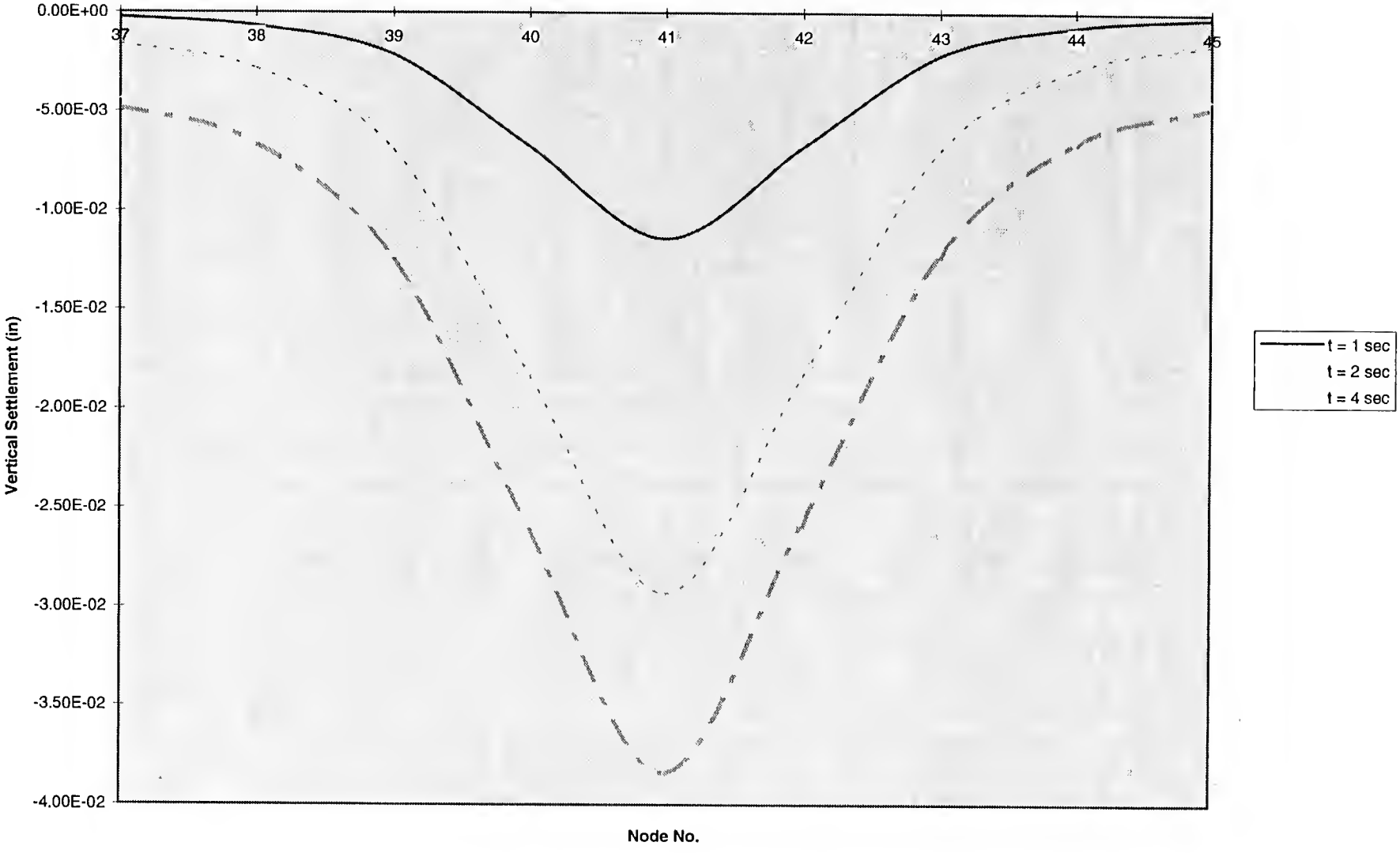
2. The vertical settlement of horizontal plane are presented.


Load-Time Function(2D)
Load (lb)
100
90
80
70
60
50
40
30
20
10
0
0
1
2
3
4
5
6
7
8
9
10
Time (sec)

Deflection and stress plots


Vertical Settlement vs Time
at node 50
0.00E+00
1.00 E-01
5.00 E-01
9.00 E-01
1.3
1.7
2.1
2.5
2.9
3.3
3.7
4.1
4.5
4.9
5.3
5.7
6.1
6.5
6.9
7.3
7.7
8.1
8.5
8.9
9.3
9.7
-1.00E-02
-2.00E-02
-3.00E-02
-4.00E-02
-5.00E-02
-6.00E-02
-7.00E-02
-8.00E-02
Vertical Settlement (in)
Time (sec)

Vertical Settlement vs Horizontal Location



Input file for Solid2D

```
2D straight edge boundary w/ ramp load on Viscoelastic Material
1000 54 40 1 9 2 100000  1.e-4  1.e+4  1.e-10  0.
0 1 0 1 1
1      0.     0.          1    1
2      1.     0.          1    1
3      2.     0.          1    1
4      3.     0.          1    1
5      4.     0.          1    1
6      5.     0.          1    1
7      6.     0.          1    1
8      7.     0.          1    1
9      8.     0.          1    1
10     0.     1.          1    0
11     1.     1.          0    0
12     2.     1.          0    0
13     3.     1.          0    0
14     4.     1.          0    0
15     5.     1.          0    0
16     6.     1.          0    0
17     7.     1.          0    0
18     8.     1.          1    0
19     0.     2.          1    0
20     1.     2.          0    0
21     2.     2.          0    0
22     3.     2.          0    0
23     4.     2.          0    0
24     5.     2.          0    0
25     6.     2.          0    0
26     7.     2.          0    0
27     8.     2.          1    0
28     0.     3.          1    0
29     1.     3.          0    0
30     2.     3.          0    0
31     3.     3.          0    0
32     4.     3.          0    0
33     5.     3.          0    0
34     6.     3.          0    0
35     7.     3.          0    0
36     8.     3.          1    0
37     0.     4.          1    0
38     1.     4.          0    0
39     2.     4.          0    0
40     3.     4.          0    0
41     4.     4.          0    0
42     5.     4.          0    0
43     6.     4.          0    0
44     7.     4.          0    0
45     8.     4.          1    0
46     0.     5.          1    0
47     1.     5.          0    0
48     2.     5.          0    0
49     3.     5.          0    0
50     4.     5.          0    0
51     5.     5.          0    0
52     6.     5.          0    0
53     7.     5.          0    0
54     8.     5.          1    0
1  1  2  11  10     1  1  1  1  1
2  2  3  12  11     1  1  2  1  1
3  3  4  13  12     1  1  3  1  1
```

```
4   4   5   14   13      1   1   4   1   1
5   5   6   15   14      1   1   5   1   1
6   6   7   16   15      1   1   6   1   1
7   7   8   17   16      1   1   7   1   1
8   8   9   18   17      1   1   8   1   1
9    10   11   20   19     1   2   1   1   1
10   11   12   21   20     1   2   2   1   1
11   12   13   22   21     1   2   3   1   1
12   13   14   23   22     1   2   4   1   1
13   14   15   24   23     1   2   5   1   1
14   15   16   25   24     1   2   6   1   1
15   16   17   26   25     1   2   7   1   1
16   17   18   27   26     1   2   8   1   1
17   19   20   29   28     1   3   1   1   1
18   20   21   30   29     1   3   2   1   1
19   21   22   31   30     1   3   3   1   1
20   22   23   32   31     1   3   4   1   1
21   23   24   33   32     1   3   5   1   1
22   24   25   34   33     1   3   6   1   1
23   25   26   35   34     1   3   7   1   1
24   26   27   36   35     1   3   8   1   1
25   28   29   38   37     1   4   1   1   1
26   29   30   39   38     1   4   2   1   1
27   30   31   40   39     1   4   3   1   1
28   31   32   41   40     1   4   4   1   1
29   32   33   42   41     1   4   5   1   1
30   33   34   43   42     1   4   6   1   1
31   34   35   44   43     1   4   7   1   1
32   35   36   45   44     1   4   8   1   1
33   37   38   47   46     1   5   1   1   1
34   38   39   48   47     1   5   2   1   1
35   39   40   49   48     1   5   3   1   1
36   40   41   50   49     1   5   4   1   1
37   41   42   51   50     1   5   5   1   1
38   42   43   52   51     1   5   6   1   1
39   43   44   53   52     1   5   7   1   1
40   44   45   54   53     1   5   8   1   1
1 1 4.67e-2  9000.0  0.30  0.
0.   0.  1   0.   0.  0.4  6
1 1
3
0.                    0.0
2.0                  -100.0
1000.                -100.0

50 2 1

37 0 2
38 0 2
39 0 2
40 0 2
41 0 2
42 0 2
43 0 2
44 0 2
45 0 2
```

Sample output of Solid2D

card 1 2D straight edge boundary w/ ramp load on Viscoelastic Material

---

card 2 parameter card

no of time-steps skipped between outputs	=	1000
number of nodes	=	54
number of elements	=	40
number of materials	=	1
number of output req	=	9
no. of d.o.f/node	=	2
no. of time steps	=	100000
time increment	=	.100E-03
coeff of mass damping	=	.100E+05
tolerance limit	=	.100E-09
acceleration of gravity	=	.00000

card 3 index card

index for accel.	=	0
index for force	=	1
index for I. C.	=	0
index for mesh output(1) or not(0)	=	1
index for plane stress(1) or strain(2)	=	1

card 4 nodal point data

node no.	x-ordinate	y-ordinate	ifx	ify
1	.000	.000	1	1
2	1.000	.000	1	1
3	2.000	.000	1	1
4	3.000	.000	1	1
5	4.000	.000	1	1
6	5.000	.000	1	1
7	6.000	.000	1	1
8	7.000	.000	1	1
9	8.000	.000	1	1
10	.000	1.000	1	0
11	1.000	1.000	0	0
12	2.000	1.000	0	0
13	3.000	1.000	0	0
14	4.000	1.000	0	0
15	5.000	1.000	0	0
16	6.000	1.000	0	0
17	7.000	1.000	0	0
18	8.000	1.000	1	0
19	.000	2.000	1	0
20	1.000	2.000	0	0
21	2.000	2.000	0	0
22	3.000	2.000	0	0
23	4.000	2.000	0	0
24	5.000	2.000	0	0
25	6.000	2.000	0	0
26	7.000	2.000	0	0
27	8.000	2.000	1	0
28	.000	3.000	1	0
29	1.000	3.000	0	0
30	2.000	3.000	0	0
31	3.000	3.000	0	0
32	4.000	3.000	0	0
33	5.000	3.000	0	0
34	6.000	3.000	0	0
35	7.000	3.000	0	0

36	8.000	3.000	1	0
37	.000	4.000	1	0
38	1.000	4.000	0	0
39	2.000	4.000	0	0
40	3.000	4.000	0	0
41	4.000	4.000	0	0
42	5.000	4.000	0	0
43	6.000	4.000	0	0
44	7.000	4.000	0	0
45	8.000	4.000	1	0
46	.000	5.000	1	0
47	1.000	5.000	0	0
48	2.000	5.000	0	0
49	3.000	5.000	0	0
50	4.000	5.000	0	0
51	5.000	5.000	0	0
52	6.000	5.000	0	0
53	7.000	5.000	0	0
54	8.000	5.000	1	0

card 5 element data

ele. no.	node-1	node-2	node-3	node-4	mat-typ	row-no	col-no	ele-cond.
1	1	2	11	10	1	1	1	1
2	2	3	12	11	1	1	2	1
3	3	4	13	12	1	1	3	1
4	4	5	14	13	1	1	4	1
5	5	6	15	14	1	1	5	1
6	6	7	16	15	1	1	6	1
7	7	8	17	16	1	1	7	1
8	8	9	18	17	1	1	8	1
9	10	11	20	19	1	2	1	1
10	11	12	21	20	1	2	2	1
11	12	13	22	21	1	2	3	1
12	13	14	23	22	1	2	4	1
13	14	15	24	23	1	2	5	1
14	15	16	25	24	1	2	6	1
15	16	17	26	25	1	2	7	1
16	17	18	27	26	1	2	8	1
17	19	20	29	28	1	3	1	1
18	20	21	30	29	1	3	2	1
19	21	22	31	30	1	3	3	1
20	22	23	32	31	1	3	4	1
21	23	24	33	32	1	3	5	1
22	24	25	34	33	1	3	6	1
23	25	26	35	34	1	3	7	1
24	26	27	36	35	1	3	8	1
25	28	29	38	37	1	4	1	1
26	29	30	39	38	1	4	2	1
27	30	31	40	39	1	4	3	1
28	31	32	41	40	1	4	4	1
29	32	33	42	41	1	4	5	1
30	33	34	43	42	1	4	6	1
31	34	35	44	43	1	4	7	1
32	35	36	45	44	1	4	8	1
33	37	38	47	46	1	5	1	1
34	38	39	48	47	1	5	2	1
35	39	40	49	48	1	5	3	1
36	40	41	50	49	1	5	4	1
37	41	42	51	50	1	5	5	1
38	42	43	52	51	1	5	6	1

39	43	44	53	52	1	5	7	1
40	44	45	54	53	1	5	8	1

card 6 & 7 material property data

material group no.	material type no.	mass density	Youngs modulus	Poisson ratio	tensile strength
1	1	.4670E-01	.9000E+04	.300	.0000E+00

cohesion	phi angle	yield criterion	tangent modulus	hardening rule	thickness(b)
.0000E+00	.00	1	.0000E+00	.000	.400

card 11 prescribed impact force

total no. of impact force history = 1

total no. of nodes applied by impact force = 1

card 12 & 13 impact force history card

force history no.	pair no.	time	iforce
1	1	.0000E+00	.0000E+00
1	2	.2000E+01	-.1000E+03
1	3	.1000E+04	-.1000E+03

card 14 nodal impact force information

node no.	x-(1),y(2)	force history no.
50	2	1

card 21 stress output information card

seq.	node#	d-(0),v-(1),a-(2),sig-(3)	x(1),y(2),xy(3)
1	37	0	2
2	38	0	2
3	39	0	2
4	40	0	2
5	41	0	2
6	42	0	2
7	43	0	2
8	44	0	2
9	45	0	2

card 21 stress output information card

seq.	node#	d-(0),v-(1),a-(2),sig-(3)	x(1),y(2),xy(3)
1	37	0	2
2	38	0	2
3	39	0	2
4	40	0	2
5	41	0	2
6	42	0	2
7	43	0	2
8	44	0	2
9	45	0	2

time =	.10000E+00	.353E-06	-.102E-06	-.126E-05	-.107E-03	-.259E-03	-.107E-03
		-.126E-05	-.102E-06	.353E-06			
time =	.20000E+00	.416E-05	-.157E-05	-.362E-04	-.438E-03	-.953E-03	-.438E-03
		-.362E-04	-.157E-05	.416E-05			
time =	.30000E+00	.108E-04	-.127E-04	-.132E-03	-.934E-03	-.189E-02	-.934E-03
		-.132E-03	-.127E-04	.108E-04			
time =	.40000E+00	.137E-04	-.420E-04	-.290E-03	-.156E-02	-.298E-02	-.156E-02
		-.290E-03	-.420E-04	.137E-04			
time =	.50000E+00	.597E-05	-.937E-04	-.502E-03	-.227E-02	-.420E-02	-.227E-02
		-.502E-03	-.937E-04	.597E-05			
time =	.60000E+00	-.161E-04	-.169E-03	-.761E-03	-.307E-02	-.551E-02	-.307E-02
		-.761E-03	-.169E-03	-.161E-04			
time =	.70000E+00	-.543E-04	-.266E-03	-.106E-02	-.392E-02	-.690E-02	-.392E-02
		-.106E-02	-.266E-03	-.543E-04			
time =	.80000E+00	-.109E-03	-.385E-03	-.139E-02	-.483E-02	-.835E-02	-.483E-02
		-.139E-02	-.385E-03	-.109E-03			
time =	.90000E+00	-.178E-03	-.523E-03	-.175E-02	-.579E-02	-.987E-02	-.579E-02
		-.175E-02	-.523E-03	-.178E-03			
time =	.10000E+01	-.262E-03	-.677E-03	-.214E-02	-.678E-02	-.114E-01	-.678E-02
		-.214E-02	-.677E-03	-.262E-03			
time =	.11000E+01	-.359E-03	-.847E-03	-.255E-02	-.781E-02	-.130E-01	-.781E-02
		-.255E-02	-.847E-03	-.359E-03			
time =	.12000E+01	-.467E-03	-.103E-02	-.297E-02	-.887E-02	-.147E-01	-.887E-02
		-.297E-02	-.103E-02	-.467E-03			
time =	.13000E+01	-.585E-03	-.123E-02	-.342E-02	-.996E-02	-.164E-01	-.996E-02
		-.342E-02	-.123E-02	-.585E-03			
time =	.14000E+01	-.713E-03	-.143E-02	-.388E-02	-.111E-01	-.181E-01	-.111E-01
		-.388E-02	-.143E-02	-.713E-03			
time =	.15000E+01	-.849E-03	-.165E-02	-.435E-02	-.122E-01	-.199E-01	-.122E-01
		-.435E-02	-.165E-02	-.849E-03			
time =	.16000E+01	-.992E-03	-.187E-02	-.484E-02	-.134E-01	-.217E-01	-.134E-01
		-.484E-02	-.187E-02	-.992E-03			
time =	.17000E+01	-.114E-02	-.210E-02	-.534E-02	-.146E-01	-.236E-01	-.146E-01
		-.534E-02	-.210E-02	-.114E-02			
time =	.18000E+01	-.130E-02	-.234E-02	-.585E-02	-.158E-01	-.255E-01	-.158E-01
		-.585E-02	-.234E-02	-.130E-02			
time =	.19000E+01	-.146E-02	-.259E-02	-.637E-02	-.170E-01	-.274E-01	-.170E-01
		-.637E-02	-.259E-02	-.146E-02			
time =	.20000E+01	-.162E-02	-.284E-02	-.691E-02	-.183E-01	-.293E-01	-.183E-01
		-.691E-02	-.284E-02	-.162E-02			
time =	.21000E+01	-.179E-02	-.310E-02	-.745E-02	-.195E-01	-.311E-01	-.195E-01
		-.745E-02	-.310E-02	-.179E-02			
time =	.22000E+01	-.197E-02	-.337E-02	-.799E-02	-.205E-01	-.323E-01	-.205E-01
		-.799E-02	-.337E-02	-.197E-02			
time =	.23000E+01	-.215E-02	-.363E-02	-.849E-02	-.213E-01	-.333E-01	-.213E-01
		-.849E-02	-.363E-02	-.215E-02			
time =	.24000E+01	-.235E-02	-.390E-02	-.894E-02	-.219E-01	-.341E-01	-.219E-01
		-.894E-02	-.390E-02	-.235E-02			

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time =  .25000E+01 -.254E-02 -.415E-02 -.933E-02 -.225E-01 -.347E-01 -.225E-01
                   -.933E-02 -.415E-02 -.254E-02
time =  .26000E+01 -.274E-02 -.438E-02 -.968E-02 -.229E-01 -.352E-01 -.229E-01
                   -.968E-02 -.438E-02 -.274E-02
time =  .27000E+01 -.292E-02 -.460E-02 -.999E-02 -.233E-01 -.356E-01 -.233E-01
                   -.999E-02 -.460E-02 -.292E-02
time =  .28000E+01 -.310E-02 -.481E-02 -.103E-01 -.237E-01 -.360E-01 -.237E-01
                   -.103E-01 -.481E-02 -.310E-02
time =  .29000E+01 -.326E-02 -.499E-02 -.105E-01 -.239E-01 -.363E-01 -.239E-01
                   -.105E-01 -.499E-02 -.326E-02
time =  .30000E+01 -.341E-02 -.516E-02 -.107E-01 -.242E-01 -.366E-01 -.242E-01
                   -.107E-01 -.516E-02 -.341E-02
time =  .31000E+01 -.355E-02 -.531E-02 -.109E-01 -.244E-01 -.368E-01 -.244E-01
                   -.109E-01 -.531E-02 -.355E-02
time =  .32000E+01 -.368E-02 -.545E-02 -.110E-01 -.246E-01 -.370E-01 -.246E-01
                   -.110E-01 -.545E-02 -.368E-02
time =  .33000E+01 -.380E-02 -.557E-02 -.112E-01 -.248E-01 -.372E-01 -.248E-01
                   -.112E-01 -.557E-02 -.380E-02
time =  .34000E+01 -.390E-02 -.569E-02 -.113E-01 -.249E-01 -.373E-01 -.249E-01
                   -.113E-01 -.569E-02 -.390E-02
time =  .35000E+01 -.400E-02 -.579E-02 -.114E-01 -.250E-01 -.374E-01 -.250E-01
                   -.114E-01 -.579E-02 -.400E-02
time =  .36000E+01 -.409E-02 -.588E-02 -.115E-01 -.251E-01 -.376E-01 -.251E-01
                   -.115E-01 -.588E-02 -.409E-02
time =  .37000E+01 -.417E-02 -.596E-02 -.116E-01 -.252E-01 -.377E-01 -.252E-01
                   -.116E-01 -.596E-02 -.417E-02
time =  .38000E+01 -.424E-02 -.604E-02 -.117E-01 -.253E-01 -.377E-01 -.253E-01
                   -.117E-01 -.604E-02 -.424E-02
time =  .39000E+01 -.431E-02 -.610E-02 -.118E-01 -.254E-01 -.378E-01 -.254E-01
                   -.118E-01 -.610E-02 -.431E-02
time =  .40000E+01 -.437E-02 -.617E-02 -.118E-01 -.255E-01 -.379E-01 -.255E-01
                   -.118E-01 -.617E-02 -.437E-02
time =  .41000E+01 -.442E-02 -.622E-02 -.119E-01 -.255E-01 -.380E-01 -.255E-01
                   -.119E-01 -.622E-02 -.442E-02
time =  .42000E+01 -.447E-02 -.627E-02 -.119E-01 -.256E-01 -.380E-01 -.256E-01
                   -.119E-01 -.627E-02 -.447E-02
time =  .43000E+01 -.451E-02 -.631E-02 -.120E-01 -.256E-01 -.381E-01 -.256E-01
                   -.120E-01 -.631E-02 -.451E-02
time =  .44000E+01 -.455E-02 -.636E-02 -.120E-01 -.257E-01 -.381E-01 -.257E-01
                   -.120E-01 -.636E-02 -.455E-02
time =  .45000E+01 -.459E-02 -.639E-02 -.121E-01 -.257E-01 -.382E-01 -.257E-01
                   -.121E-01 -.639E-02 -.459E-02
time =  .46000E+01 -.462E-02 -.643E-02 -.121E-01 -.257E-01 -.382E-01 -.257E-01
                   -.121E-01 -.643E-02 -.462E-02
time =  .47000E+01 -.465E-02 -.646E-02 -.121E-01 -.258E-01 -.382E-01 -.258E-01
                   -.121E-01 -.646E-02 -.465E-02
time =  .48000E+01 -.468E-02 -.649E-02 -.122E-01 -.258E-01 -.383E-01 -.258E-01
                   -.122E-01 -.649E-02 -.468E-02
time =  .49000E+01 -.471E-02 -.651E-02 -.122E-01 -.258E-01 -.383E-01 -.258E-01
                   -.122E-01 -.651E-02 -.471E-02
time =  .50000E+01 -.473E-02 -.654E-02 -.122E-01 -.259E-01 -.383E-01 -.259E-01
                   -.122E-01 -.654E-02 -.473E-02
time =  .51000E+01 -.475E-02 -.656E-02 -.122E-01 -.259E-01 -.383E-01 -.259E-01
                   -.122E-01 -.656E-02 -.475E-02
time =  .52000E+01 -.477E-02 -.658E-02 -.123E-01 -.259E-01 -.383E-01 -.259E-01
                   -.123E-01 -.658E-02 -.477E-02
time =  .53000E+01 -.479E-02 -.659E-02 -.123E-01 -.259E-01 -.384E-01 -.259E-01
                   -.123E-01 -.659E-02 -.479E-02
time =  .54000E+01 -.480E-02 -.661E-02 -.123E-01 -.259E-01 -.384E-01 -.259E-01
                   -.123E-01 -.661E-02 -.480E-02
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time =  .55000E+01 -.482E-02 -.663E-02 -.123E-01 -.260E-01 -.384E-01 -.260E-01
                   -.123E-01 -.663E-02 -.482E-02
time =  .56000E+01 -.483E-02 -.664E-02 -.123E-01 -.260E-01 -.384E-01 -.260E-01
                   -.123E-01 -.664E-02 -.483E-02
time =  .57000E+01 -.485E-02 -.665E-02 -.123E-01 -.260E-01 -.384E-01 -.260E-01
                   -.123E-01 -.665E-02 -.485E-02
time =  .58000E+01 -.486E-02 -.667E-02 -.123E-01 -.260E-01 -.384E-01 -.260E-01
                   -.123E-01 -.667E-02 -.486E-02
time =  .59000E+01 -.487E-02 -.668E-02 -.124E-01 -.260E-01 -.385E-01 -.260E-01
                   -.124E-01 -.668E-02 -.487E-02
time =  .60000E+01 -.488E-02 -.669E-02 -.124E-01 -.260E-01 -.385E-01 -.260E-01
                   -.124E-01 -.669E-02 -.488E-02
time =  .61000E+01 -.489E-02 -.670E-02 -.124E-01 -.260E-01 -.385E-01 -.260E-01
                   -.124E-01 -.670E-02 -.489E-02
time =  .62000E+01 -.490E-02 -.671E-02 -.124E-01 -.260E-01 -.385E-01 -.260E-01
                   -.124E-01 -.671E-02 -.490E-02
time =  .63000E+01 -.491E-02 -.671E-02 -.124E-01 -.260E-01 -.385E-01 -.260E-01
                   -.124E-01 -.671E-02 -.491E-02
time =  .64000E+01 -.491E-02 -.672E-02 -.124E-01 -.261E-01 -.385E-01 -.261E-01
                   -.124E-01 -.672E-02 -.491E-02
time =  .65000E+01 -.492E-02 -.673E-02 -.124E-01 -.261E-01 -.385E-01 -.261E-01
                   -.124E-01 -.673E-02 -.492E-02
time =  .66000E+01 -.493E-02 -.673E-02 -.124E-01 -.261E-01 -.385E-01 -.261E-01
                   -.124E-01 -.673E-02 -.493E-02
time =  .67000E+01 -.493E-02 -.674E-02 -.124E-01 -.261E-01 -.385E-01 -.261E-01
                   -.124E-01 -.674E-02 -.493E-02
time =  .68000E+01 -.494E-02 -.675E-02 -.124E-01 -.261E-01 -.385E-01 -.261E-01
                   -.124E-01 -.675E-02 -.494E-02
time =  .69000E+01 -.495E-02 -.675E-02 -.124E-01 -.261E-01 -.385E-01 -.261E-01
                   -.124E-01 -.675E-02 -.495E-02
time =  .70000E+01 -.495E-02 -.676E-02 -.124E-01 -.261E-01 -.385E-01 -.261E-01
                   -.124E-01 -.676E-02 -.495E-02
time =  .71000E+01 -.495E-02 -.676E-02 -.124E-01 -.261E-01 -.385E-01 -.261E-01
                   -.124E-01 -.676E-02 -.495E-02
time =  .72000E+01 -.496E-02 -.677E-02 -.125E-01 -.261E-01 -.385E-01 -.261E-01
                   -.125E-01 -.677E-02 -.496E-02
time =  .73000E+01 -.496E-02 -.677E-02 -.125E-01 -.261E-01 -.386E-01 -.261E-01
                   -.125E-01 -.677E-02 -.496E-02
time =  .74000E+01 -.497E-02 -.677E-02 -.125E-01 -.261E-01 -.386E-01 -.261E-01
                   -.125E-01 -.677E-02 -.497E-02
time =  .75000E+01 -.497E-02 -.678E-02 -.125E-01 -.261E-01 -.386E-01 -.261E-01
                   -.125E-01 -.678E-02 -.497E-02
time =  .76000E+01 -.497E-02 -.678E-02 -.125E-01 -.261E-01 -.386E-01 -.261E-01
                   -.125E-01 -.678E-02 -.497E-02
time =  .77000E+01 -.498E-02 -.679E-02 -.125E-01 -.261E-01 -.386E-01 -.261E-01
                   -.125E-01 -.679E-02 -.498E-02
time =  .78000E+01 -.498E-02 -.679E-02 -.125E-01 -.261E-01 -.386E-01 -.261E-01
                   -.125E-01 -.679E-02 -.498E-02
time =  .79000E+01 -.498E-02 -.679E-02 -.125E-01 -.261E-01 -.386E-01 -.261E-01
                   -.125E-01 -.679E-02 -.498E-02
time =  .80000E+01 -.499E-02 -.679E-02 -.125E-01 -.261E-01 -.386E-01 -.261E-01
                   -.125E-01 -.679E-02 -.499E-02
time =  .81000E+01 -.499E-02 -.680E-02 -.125E-01 -.261E-01 -.386E-01 -.261E-01
                   -.125E-01 -.680E-02 -.499E-02
time =  .82000E+01 -.499E-02 -.680E-02 -.125E-01 -.261E-01 -.386E-01 -.261E-01
                   -.125E-01 -.680E-02 -.499E-02
time =  .83000E+01 -.499E-02 -.680E-02 -.125E-01 -.261E-01 -.386E-01 -.261E-01
                   -.125E-01 -.680E-02 -.499E-02
time =  .84000E+01 -.500E-02 -.680E-02 -.125E-01 -.261E-01 -.386E-01 -.261E-01
                   -.125E-01 -.680E-02 -.500E-02
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time =  .85000E+01 -.500E-02 -.681E-02 -.125E-01 -.261E-01 -.386E-01 -.261E-01
                   -.125E-01 -.681E-02 -.500E-02
time =  .86000E+01 -.500E-02 -.681E-02 -.125E-01 -.261E-01 -.386E-01 -.261E-01
                   -.125E-01 -.681E-02 -.500E-02
time =  .87000E+01 -.500E-02 -.681E-02 -.125E-01 -.261E-01 -.386E-01 -.261E-01
                   -.125E-01 -.681E-02 -.500E-02
time =  .88000E+01 -.500E-02 -.681E-02 -.125E-01 -.261E-01 -.386E-01 -.261E-01
                   -.125E-01 -.681E-02 -.500E-02
time =  .89000E+01 -.501E-02 -.681E-02 -.125E-01 -.261E-01 -.386E-01 -.261E-01
                   -.125E-01 -.681E-02 -.501E-02
time =  .90000E+01 -.501E-02 -.682E-02 -.125E-01 -.262E-01 -.386E-01 -.262E-01
                   -.125E-01 -.682E-02 -.501E-02
time =  .91000E+01 -.501E-02 -.682E-02 -.125E-01 -.262E-01 -.386E-01 -.262E-01
                   -.125E-01 -.682E-02 -.501E-02
time =  .92000E+01 -.501E-02 -.682E-02 -.125E-01 -.262E-01 -.386E-01 -.262E-01
                   -.125E-01 -.682E-02 -.501E-02
time =  .93000E+01 -.501E-02 -.682E-02 -.125E-01 -.262E-01 -.386E-01 -.262E-01
                   -.125E-01 -.682E-02 -.501E-02
time =  .94000E+01 -.501E-02 -.682E-02 -.125E-01 -.262E-01 -.386E-01 -.262E-01
                   -.125E-01 -.682E-02 -.501E-02
time =  .95000E+01 -.502E-02 -.682E-02 -.125E-01 -.262E-01 -.386E-01 -.262E-01
                   -.125E-01 -.682E-02 -.502E-02
time =  .96000E+01 -.502E-02 -.682E-02 -.125E-01 -.262E-01 -.386E-01 -.262E-01
                   -.125E-01 -.682E-02 -.502E-02
time =  .97000E+01 -.502E-02 -.683E-02 -.125E-01 -.262E-01 -.386E-01 -.262E-01
                   -.125E-01 -.683E-02 -.502E-02
time =  .98000E+01 -.502E-02 -.683E-02 -.125E-01 -.262E-01 -.386E-01 -.262E-01
                   -.125E-01 -.683E-02 -.502E-02
time =  .99000E+01 -.502E-02 -.683E-02 -.125E-01 -.262E-01 -.386E-01 -.262E-01
                   -.125E-01 -.683E-02 -.502E-02
time =  .10000E+02 -.502E-02 -.683E-02 -.125E-01 -.262E-01 -.386E-01 -.262E-01
                   -.125E-01 -.683E-02 -.502E-02
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